THE IRON TRADE REVIEW

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CAR FAMINE.

SPURS RAILROADS TO PLACE HEAVY ORDERS FOR EQUIPMENT.

Entire Rail Product for 1906 Will Soon Be Sold—Prices of Various Products Bdvancing.

Complaints of car shortage are being made with increasing force. The movement of ore is being hampered and in many places it is difficult to obtain prompt delivery of coke. In some sections the car shortage is also felt in the slow delivery of pig iron. That the railroads keenly appreciate present conditions is shown by the very large orders for all kinds of equipment which are being placed. Arrangements for tremendous business next year extend from ore to the finished product. The Oliver Iron Mining Co., a subsidiary concern of the United States Steel Corporation, has just ordered twenty-seven 90-ton steam shovels—the largest order of the kind ever placed—and 55 locomotives; the equipment being intended principally for use in Mesabi mining operations. Very heavy orders for rails from the Pennsylvania and B. & O. systems are pending.

Advancing Pig Iron Prices.

The upward tendency of prices is still the leading feature of the pig iron market. Prices for Southern brands show quite a wide divergence in different territories. While iron has been sold in the Cincinnati district in limited amounts on the basis of $12.50, Birmingham, sales have been made elsewhere at $13, and it is reported that some important Southern furnace interests have sold up for the next four months and have decided to hold for $14. In the Northern market, considerably higher prices are prevailing, especially in Chicago and Cleveland. In both of those cities, the withdrawal of local producers from the market has made it necessary to ship long distances; Buffalo being drawn upon for large tonnages. It is possible to ship iron from Buffalo by boat on the basis of $17.75, Chicago. Some sales have been made at $15.50, valley, but for early delivery $16 is more nearly the correct quotation. On basic and Bessemer, $15.50 at the furnace can be done with difficulty.

Ferro is Still Higher.

The price of ferro-manganese is again advanced—$60 and higher for any delivery this year now being asked. There is very little ferro on the market and deliveries are uncertain.

Plate Prices Unchanged.

At the meeting of plate manufacturers present conditions were carefully considered with the view to advancing quotations, but it was decided to take no action until the next meeting. The companies which have pursued the policy of accepting premiums will continue to do so. The Pennsylvania railroad system, which recently placed orders for 16,000 cars, is about to order an equal number. The Vandalia system is also expected to order 16,000 steel cars, and the Central of New Jersey has placed an order for 1,000 steel hopper gondolas. These and other orders cause a tremendous demand for plates, but there is a strong conservative interest opposed to advancing the price.

Billet Price Advanced.

The mill mentioned last week as having inquiries for 18,000 tons of open-hearth billets for the first quarter of next year has refused to quote. Both Bessemer and open-hearth billets are $1 higher than a week ago.

Heavy Rail Orders Pending.

The B. & O. R. R. has authorized the purchase of 71,000 tons of rails and other heavy orders are pending. Trolley lines have purchased heavily during the past week. The continued buying of rails following the unprecedented business of a few weeks ago is indeed remarkable, and indicates that all of next year's product will be contracted for before Jan. 1.

Bars in Strong Demand.

There is a strong demand for both steel and iron bars. The expected advance in steel bars may be made at any time, but all the largest consumers have covered for their requirements and an advance would have little effect. In bar iron the quotation is now 1.80c at Chicago, and the demand is strong. Some mills have orders for all they can turn out up to July 1.

Various Improvements.

The demand for sheets is excellent. The disposition to make special concessions is less marked. There is considerable competition in tin plate, and low prices have recently been made. The demand for wire, merchant steel, pipes and tubes is very satisfactory.

High Prices for Coke.

Advance in quotations of coke and increasing difficulties in obtaining prompt delivery are causing considerable anxiety among consumers. As high as $3 is being quoted on strictly Connellsville furnace coke for the first half of next year, while as high as $3.50 is being asked for foundry coke. Prompt furnace coke is difficult to obtain at any price.

Old Material Is Firm.

The prices of old material are firm and advancing. On account of high prices of pig iron, tremendous demands for bar iron and the approach of bad weather, dealers are confident that higher quotations will prevail.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Pig Iron Price Advanced—Continued Buying of Rails—Billet Meeting.

OFFICE OF *The Iron Trade Review*,
521 PARK BUILDING, October 18.

Pig iron in the local market is easily up a quarter a ton in the week, while some merchant furnacemen express quite exalted views of the prospects of prices in the winter. Buying has been scarcely as heavy, although some business has been done for the first half of next year.

A general meeting of the billet manufacturers will be held in New York next Tuesday, but nothing will be done as to prices, the market having shown excellent capacity for taking care of itself, present prices being $4 to $5 a ton above the old "official" prices. We are quoting billets nominally about a dollar higher than last week.

It is very probable that $27 will be named as the settlement price on November tonnages of sheet bars on adjustment contracts, against $26 for October tonnages. A large quantity of sheet and tin plate bars is going out on these contracts, it being scarcely possible to buy any in the open market.

The Baltimore & Ohio is placing orders this week for 71,000 tons of rails, with Carnegie, Cambria and Maryland. Despite the heavy buying of rails recently good orders continue to be booked, and at the present rate practically the entire 1906 tonnage of rails will have been sold before the year opens.

The leading interest has taken a good order for 6-in. line pipe in Louisiana and other good business in line pipe is pending.

The Pressed Steel Car Co. is absorbing the Pennsylvania Malleable Co. and the Central Steel Car Wheel Co., which have been allied concerns since their formation.

Pig Iron.—Buying has not been as heavy in the past week as in the previous week, but the market has advanced nevertheless, and is quotable about 25 cents higher all around, while extreme asking prices have been advanced still further, and a larger proportion of furnaces are asking prices measurably above the market than was the case one week or two weeks ago. Some foundry iron at $15.25, valley, has been cleaned up, and the absolute minimum of the market is now $15.50, with not much tonnage available at that figure, and most interests quoting at not under $16. We note sales of round tonnages at $15.50, both for the balance of this year, and for the first half of next year, to Pittsburg consumers. On small lots, carloads to 100 tons, for early delivery, $15.75 and $16 has been freely paid. In forge the market is considerably higher, and it is doubtful if $14.50, furnace, could be done in any case, as high as $15 being actually paid on a fair tonnage, where the consumers preferred a particular brand. All the $15.25 Bessemer and basic iron has disappeared, and $15.50 at furnace can now be done only with difficulty, and for easy delivery. Some sales of moderate tonnages have been made at $15.75, for early delivery. The total transactions in Bessemer and basic have not been large. Reports that the steel corporation is buying additional Bessemer pig iron for October delivery are not substantiated, and it is believed that the corporation will not buy until it takes November and December tonnage. It is probable that the corporation would have to pay $16 for any round tonnage, and this it would scarcely like to do. It is not definitely known yet that the corporation will increase its production of Bessemer by diverting some ferro-manganese capacity to standard pig, but it has in the past month bought about 30,000 tons of foreign ferro, when it was understood to be covered by its own production and previous purchases. Two of its regular ferro furnaces, one Edgar Thomson and one Lucy, were relined last summer, and the change from ferro to standard iron could be made at these furnaces without difficulty. We revise prices as follows:

Bessemer, Valley	$15.50 to $16.00
Bessemer, Pittsburg	16.35 to 16.85
No. 1 Foundry, Pittsburg	16.85 to 17.35
No. 2 Foundry, Pittsburg	16.35 to 16.85
Gray Forge, Pittsburg	15.85 to 15.85
Basic, Valley	15.50 to 15.75
Basic, Pittsburg	16.35 to 16.60

Ferro-Manganese.—The market advanced sharply last week to $60 and higher for any delivery this year, and we now quote such delivery at $61 to $62, delivered Pittsburg. We note a sale of 100 tons or more at $61 and of more than carload lots at $62. There is very little ferro to be had, and deliveries are very hard to obtain, sellers being loath to guarantee delivery, even if given a leeway of more than a month. No definite market price can be quoted for next year, but the conditions which make ferro so scarce and high for this year do not necessarily bear on next year, in which delivery consumers do not appear to be especially interested as yet.

Billets.—We understand the mill mentioned last week as having inquiries for 18,000 tons of open-hearth billets for first quarter of next year refused to quote. We quote Bessemer billets nominally at $26 and open-hearth at $27, for delivery this year, or $1 higher than a week ago. Actual sales have been very light. We note a quotation of $25 on 5,000 tons of Bessemer billets for first quarter of next year. The settlement price on November tonnage of sheet bars on adjustment contracts should be announced on Friday, and the trade expects the price to be $27 for long lengths, f. o. b. Pittsburg, an advance of $1 over October bars. An Ohio valley interest has lately transferred a large tonnage of sheet bar business to the Republic Iron & Steel Co., but outside of this it does not appear that this company is booking sheet bar business, nor is it apparently booking rail business for next year. When the new management to be elected today takes hold, it is to be presumed that the definite policy will be outlined. We quote forging billets nominally $28 and higher. Wire rods are about $32 and chain rods $33, f. o. b. Pittsburg.

Muck Bar.—We note a recent sale at a price equal to $28.05, Pittsburg, and quote the market at this up to $28.50, delivered Pittsburg, according to circumstances.

Skelp.—There is little being done, mills being sold up quite well. We quote prices unchanged as follows:

Bessemer steel, grooved, 1.55c; sheared, 1.60c; open-hearth, grooved, 1.60c; sheared, 1.65c; iron, grooved, 1.60c to 1.65c; sheared, 1.65c to 1.70c.

Rails and Track Material.—The chief point in the rail market is the Baltimore & Ohio order for 71,000 tons, which is being distributed this week. About half will probably come to the local mill, which booked last week nearly 50,000 tons from various roads. The rail business keeps up very well, and the end of this year will probably see nearly all the 1906 tonnage sold. Light rails continue very firm. Railroad spikes are higher, $1.90 being now quoted on carload and larger lots, and $1.95 on less than carload lots. We note a sale of 1,000 kegs at $1.90. We quote:

Fifty pounds and heavier, 500-ton lots and over, $28; carload lots and less than 500 tons, $30; less than carload lots, $32; light rails, 16-lb., $29 to $30; 20-lb., $27.50 to $28;

25 to 45-lb., $26; angle bars for standard sections, 1.50c; spikes, $1.90 to $1.95.

Plates.—The Pennsylvania railroad system is about to place the balance of its car order, having placed orders for 16,150 cars recently and now having about an equal number to place. Other car business is in sight. Scattered business continues very good. The local mills are sold up for months ahead, and in possession of the actual specifications, so that they are turning away orders, which in some cases go to the Eastern mills, which are not booked up so far ahead.

A meeting of plate manufacturers was held in New York yesterday. The advance predicted for some time was not made at yesterday's meeting, but may nevertheless be made shortly. It is understood that there was considerable sentiment favoring an advance, but that the Eastern mills opposed the move.

Tank plate, ¼ in. thick, 6¼ in. to 100 in., 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 lb.: Flange and boiler steel, 10c; marine, A. B. M. A. and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in. wide, not less than 25c extra; plates 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, 10c extra; gauges 7 and 8, 15c extra; No. 9, 25c extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except Pacific Coast.

Merchant Bars.—Tonnage is excellent in both steel and iron bars. The advance in steel bars, which has been expected for some time, may be made before the month is out. We note a sale of 1,000 tons of various merchant mill products, in which there was a fair tonnage of merchant steel bars, on which a premium of a trifle over a dollar a ton was paid, but on ordinary sales no premiums rule. In common iron bars we note a sale of 2,000 tons at a very good price. On small lots of iron bars for early shipment 1.75c f. o. b. Youngstown, is being paid and on larger lots the minimum quotation is 1.70c, Youngstown, the market being firmer than a week ago, although not quotably higher. We continue to quote:

Common iron bars, 1.70c, Youngstown; 1.75c, Pittsburg; hoops, 1.75c, and bands, 1.50c; taking hoop and band extras, respectively. Bessemer steel bars 1.50c; open-hearth steel bars, 1.50c; plow and cultivator, 1.50c, net; channels, angles, zees and tees under 3 in., 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Structural Material.—There is nothing particularly new in this line business keeping up well in contracts for next year. There is scarcely anything obtainable for delivery this year. Angles are being sold at premiums of from $1 to $3 a ton, even for extended delivery. We continue to quote regular mill prices:

Beams and channels, 15 in. and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles, from 3 to 8 in. inclusive, 1.70c; universal and sheared plate, 6¼ in and wider, 1.60c, base.

Sheets.—The market is distinctly improved, and while the market is not quotably higher, the nominal quotations are now the absolute market, all the special concessions which were more or less in vogue a few weeks ago on any attractive business being now withdrawn. The absolute minimum on carloads, with desirable specifications, is 2.25c to 2.30c on black and 3.30c to 3.35c on galvanized, No. 28 gauge. On very large lots 2.20c on black and 3.25c on galvanized is done in some cases. Many of the mills have withdrawn from the market at these prices.

We quote the official prices as follows, these being quite nominal but well representing the differentials between gauges:

No. 30, 2.65c; No. 29 2.55c; No. 28, 2.40c; No. 27, 2.30c; Nos. 25-26, 2.25c; Nos. 22-24, 2.20c; Nos. 17-21, 2.15c; Nos. 15-16, 2.10c; Nos. 13-14, 2.05c; Nos. 10-12, 2c. Galvanized, Nos. 10-11, 2.35c; Nos. 12-14, 2.45c; Nos. 15-16, 2.55c; Nos. 17-21, 2.70c; Nos. 22-24, 2.85c; Nos. 25-26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 29, 3.70c; No. 30, 3.95c. Quotations f. o. b. Pittsburg, 30 days net, 2 percent off cash 10 days.

Wire and Wire Nails.—The market is well held at the recent advance, but is not particularly active, as buyers are covered for a short time ahead. We quote regular mill prices as follows:

Wire nails, jobbers' carload lots, $1.80; retailers' carload lots, $1.85, and less than carloads, $1.95; painted barb wire, $1.95 for jobbers in carloads; retailers' carloads, $2, and less than carloads, $2.10, with 30c for galvanizing. Annealed smooth fence wire is held at $1.65, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o.b. Pittsburg, 60 days, with 2 percent discount for cash in 10 days. Iron and steel cut nails, $1.70 to $1.75.

Merchant Steel.—The market continues in satisfactory condition, with no special excitement, but an excellent volume of business being booked. We continue to quote:

Cold rolled and ground shafting, 50 percent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.0c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.70c to 1.75c; toe calk, 2c to 2.05c.

Pipes and Tubes.—The market continues very firm on merchant pipe, the independents practically staying out of the market, and business going pretty exclusively to the leading interest, which is adhering strictly to the new official prices recently promulgated. Some further good line pipe business has been booked, the leading interest, for example, taking a nice contract for 6-in. pipe in Louisiana. Other business is being figured upon. We quote discounts in carload lots to consumers as follows, prices to large jobbers being one point lower:

	Steel		Iron	
Consumers' Carloads	Black	Galv.	Black	Galv.
⅛ and ¼ inch	71	55	68½	52½
⅜ and ½ inch	75	63	72½	60½
¾ to 6 inches	79	69	77	67
7 to 12 inches	74	59	72	56½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	61½	49½
½ to 4 inches	71	59	68½	56½
4½ to 8 inches	67	55	64½	52½
Double extra strong plain ends, ½ to 8 inches	60	49	57½	46½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron
1 to 1¼ inches	44	41
1¼ to 2¼ inches	56	41
2½ inches	58	46
2¾ to 5 inches	64	53
6 to 13 inches	56	41

Less than carloads, two points less.

Old Material.—The market has not been particularly active, but prices are firmly maintained by dealers who are confident of the future on account of the advancing pig iron market and the approach of bad weather. We quote prices nominally unchanged as follows:

Heavy melting stock, $16.25 to $16.50; low phosphorus scrap, $19.50 to $20.50; rerolling rails, $16; cast scrap, $14.75 to $15.25; borings, $9.75 to $10; No. 1 wrought, $16.50 to $17.

Coke.—There is further excitement in coke, and almost prohibitive figures are being quoted on contracts for furnace coke for next year, as high as $3 being quoted on

strictly Connellsville furnace coke for the first half, while it is doubtful if $2.75 could be shaded on any desirable grade. Prompt furnace coke is also higher, and we quote $2.75 to $3, with very little to be had, regardless of price. We quote standard Connellsville 72-hour foundry coke at $3 and upward, as high as $3.50 being asked. Production in the week ending Oct. 7 shows an increase over the previous week in the regular Connellsville region of over 3,700 tons, being estimated at 274,752 tons, against 271,034 tons the previous week. Shipments for the week were 13,436 cars, a gain of about 300 cars. Production in the lower Connellsville region for the same week is estimated at 87,679 tons, against 88,877 tons the previous week.

CHICAGO.

Market Very Strong With Prices Uniform and Well-Distributed.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, October 18.

Buying of iron and steel continues very strong. There is no excessive demand for any product, but for the first time in some months all lines are sharing equally in the trading. It is noticeable also that the smaller class of makers are getting a more equitable share of the business offered than before, which has resulted in a greater uniformity of prices in those products that have been conspicuous for their fluctuations. Pig iron remains the center of attraction, and while made up of small sales, the aggregate tonnage transferred last week was of good proportions. Prices are a shade stronger if anything, some Northern makers asking 15 cents more and Southern furnaces 25 cents more than a week ago. Official quotations on billets have remained at $21 Pittsburg for 4 x 4's for some months, but $25 and $26 are the ruling prices. Iron and steel bars are very strong, one lot of 1,000 tons of the latter for immediate shipment to an Eastern consumer having been sold on the basis of 1.60c Pittsburg. Bar iron is firm at 1.80c Chicago. Trading in plates, rails and structural shapes is quiet. All the large interests are practically sold up on these products for the next nine months, and are not encouraging new business. The question giving the most uneasiness is that of satisfying a crowd of hungry and insistent customers, whose specifications continually exceed the output of mills. No improvement is noted in the coke situation. Supplies are short of the requirements, and Connellsville 72-hour grades are quoted from $3.25 to $3.50 at the ovens, with strong leanings toward the latter figure. Scrap is climbing upward, prices this week being an average of 50 cents higher than a week ago

Pig Iron.—The strongest feature of the local market is the scarcity of Northern irons. All the merchant furnaces in this district have closed their order books for the time being, having sold their theoretical output up to July 1 next. Valley furnaces and stacks located at points from which it is possible to make lake shipments are being called upon to supply the deficiency. The former have advanced their prices to $16 f. o. b. cars, making the Chicago price $18.30 for No. 2, almost prohibitive in comparison with Southern quotations. Relief, however, has been found in the open weather that has prevailed for the past six weeks, and iron from Buffalo shipped by boat is being offered on the basis of $17.75 Chicago. The general quotation for Northern iron remains $17.50, but it is almost impossible to get anything at this price. The same condition is true with regard to Southern irons. Those furnaces with iron to sell are asking $13.50 Birmingham for No. 2 foundry, though the market still rests at $13. Virginia irons range from $14.50 to $15 furnace, or $17.15 to $17.65 Chicago. Trading last week was of brisk proportions, transactions ranging from 3,000 tons downward. Among the inquiries received was one from a large Milwaukee machinery manufacturer, asking prices on 8,000 to 10,000 tons. Charcoal iron is scarce and was again advanced 50 cents a ton. We have revised our prices and quote as follows:

Lake Superior charcoal	$18.00 to 18.50
Northern Foundry No. 1	18.00 to 18.25
Northern Foundry No. 2	17.50 to 17.75
Northern Foundry No. 3	17.00 to 17.25
Northern Scotch Foundry	18.00 to 18.25
Ohio Strong Softeners No. 1	18.30 to 18.80
Ohio Strong Softeners No. 2	17.30 to 17.80
Southern Foundry No. 1	17.15 to 17.65
Southern Foundry No. 2	16.65 to 17.15
Southern Foundry No. 3	16.15 to 16.65
Southern Foundry No. 4	15.65 to 16.15
Southern No. 1 Soft	17.15 to 17.65
Southern No. 2 Soft	16.65 to 17.15
Southern Gray Forge	15.15 to 15.40
Southern Mottled	14.90 to 15.15
Southern Silveries (4 percent to 6 percent Silicon)	17.65 to 18.15
Jackson Co. Silveries (8 percent to 10 percent Silicon)	19.80 to 20.80
Alabama and Georgia Car Wheel	20.15 to 20.65
Malleable Bessemer	17.50
Basic Iron	16.65 to 17.15

Billets.—Current demand for forging billets is limited to the supply obtainable, which is not large. Local prices for this product range from $32 to $37, according to tonnage and delivery. The meeting of the billet association in New York Wednesday is expected to result in an advance of the official price.

Bars.—Further large railroad tonnages for bar iron were closed up last week. The local market is very strong at 1.80c Chicago. Specifications are very heavy, all of the Western mills operating double turn. Demand for steel bars is also heavy. One consumer who wanted quick shipment on a 1,000-ton lot, paid a premium of $2 a ton to get it, or 1.60c Pittsburg. Many buyers are sending in supplementary orders, having discovered that their original estimation of their season's requirements is far short of actual needs. The larger sizes of steel shapes, especially rounds, are in greatest demand, and on these most producers are at least three months behind in deliveries. Prices are very strong. We quote carload lots, mill shipments, Chicago delivery, soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 1.91½c base, full extras. Hard steel angles, 1.60c to 1.65c. Demand from store is heavy and prices are firm. We quote bar iron, 1.95c to 2c base, full extras; soft steel bars and bands, 1.85c base, half extras; soft steel angles, channels and tees, under 3 in., 1.95c; hoops, 2.20c to 2.30c base, full extras.

Sheets.—In some quarters there is a disposition to hold fast to profit-producing prices, and as a result the market has a better tone than it has had for several weeks. Demand is of good volume, both for black and galvanized sheets. While our prices given below generally express the market, it is possible on a desirable specification, to shade these. With this reservation, we quote carload lots, mill shipments, Chicago delivery, blue annealed sheets, Nos. 9 and 10, 1.81½c; Nos. 11 and 12, 1.86½c; Nos. 13 and 14, 1.91½c; Nos. 15 and 16, 2.01½c. On box annealed, one pass, cold rolled, we quote: Nos. 18 and 20, 2.21½c; Nos. 22 and 24, 2.26½c; Nos. 25 and 26, 2.31½c; No. 27, 2.36½c; No. 28, 2.46½c; No. 29, 2.56½c. We quote on lots from warehouse stocks, as follows: No. 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.25c to 2.30c; No. 16, 2.35c to 2.40c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.60c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.90c; No. 29, 3c to 3.05c. Galvanized sheets, mill shipments, Chicago delivery, are quoted as follows: Nos. 12 and 14, 2.41½c; No. 16, 2.56½c; Nos. 18 and 20, 2.71½c; Nos. 22 and 24, 2.86½c; No. 26, 3.06½c; No. 27, 3.26½c; No. 28, 3.46½c; No. 29, 3.71½c. Jobbers' prices on small lots from store are as follows: Nos. 10

to 14, inclusive, 3.10c; No. 16, 3c; Nos. 18 and 20, 3.10c; No. 22 and 24, 3.25c; No. 26, 3.50c; No. 27, 3.70c; No. 28, 3.95c; No. 29, 4.40c; No. 30, 4.85c.

Structural Steel.—An insistent demand for all shapes and sizes is felt in all selling quarters. Specifications are very heavy, but the slow deliveries from mill have caused some delay in the completion of contracts. Local jobbers are able to replenish their stocks only by scouring the country for material, and picking up odd lots of different sizes here and there. Prices are very firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in., inclusive, 1.86½c; angles, 3 to 6 in., ¼ in. and heavier, 1.86½c; angles larger than 6 in. on one or both legs, 1.96½c; beams larger than 15 in., 1.96½c; zees, 3 in. and over, 1.86½c; tees, 3 in. and over, 1.91½c; with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. We quote prices from store as follows: Angles, 2.25c to 2.35c; beams and channels, base sizes, 2.25c to 2.75c; tees and zees, 2.30c to 2.35c. These prices are for either random lengths or cut to specifications in excess of 5 ft.

Plates.—New business, while not large, is of healthy proportions. To a large extent, consumers in the West have covered for their needs, and routine orders are made up of supplementary tonnages. We quote carload lots, Chicago delivery, mill shipments, as follows: Tank steel, ¼ in. and heavier, up to 100 in. wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Jobbers report a good movement from local stocks with store prices firm. We quote on small lots as follows: Tank steel, ¼ in. and heavier, up to and including 72 in. wide, 2c to 2.10c; over 72 in. wide up to 100 in., 2.10c to 2.20c; over 100 in. wide, usual mill extras, 3-16 in. up to but not including 72 in. wide, 2.10c; 3-16 in., 72 in. wide, 2.35c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—There is a brisk demand for light rails from all parts of the country, but especially from the far West. The local maker is continually sold up and is experiencing some difficulty in coping with present requirements. Many electrical and interurban enterprises are buying light rails because of their inability to get standard sections, and using relayers where it is impossible to get either of the former. Demand for track supplies is very heavy. Several small orders for standard sections were taken last week for delivery in the last quarter of the year. The tonnage on the South Chicago mill's books is over its annual theoretical capacity. We quote heavy sections in 500-ton lots, f. o. b. mill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails, f. o. b. Milwaukee mill: 12-lb. sections, $30; 16-lb., $29; 20-lb., $28; 25-lb. $27; 30, 35, 40 and 45-lb. sections, $25.50. Track supplies, f. o. b. Joliet, are as follows: Angle bars, 1.50c to 1.75c, according to tonnage; spikes, first quality, 1.85c to 1.95c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts, 2.25c to 2.65c.

Merchant Steel.—Very little new business is coming forward, as the leading makers have been out of the market for some weeks. Specifications are very heavy and insistent as to delivery. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2.10c; sleigh shoe, flat sizes, 1.71½c; concave and convex, 1.86½c; cutter shoe, 2.35c to 2.40c; smooth finished machinery steel, 1.91½c; smooth finished tire, 1.86½c; plow steel, 2.20c and upward, according to quality; toe calk steel, 2.21½c; railway spring, 1.86½c. Cold rolled shafting, 52½ percent off to dealers, 50 percent off in carload lots, and 45 percent in less than carload lots. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and up.

Cast Iron Pipe.—Routine business is good and prices are firm. Several small municipal contracts were taken last week by the leading maker, but the aggregate tonnage is not large. Action on the Portland (Ore.) contract for several thousand tons has been postponed a month. The only other contract up is that of Los Angeles, Cal., for 5,000 tons, which will be let today. We quote carload lots, f. o. b. Chicago: 4-in. water pipe, $30; 6, 8, 10 and 12-in., $29; larger sizes, $28.50; gas pipe, $1 extra.

Merchant Pipe.—The active continuance of building work as a result of the lengthening of warm weather has led to a brisk demand during an ordinarily dull season. Jobbers report an active movement of stocks. Prices are strengthening, and by some interests card rates are adhered to. Basing prices are given in our Pittsburg report.

Boiler Tubes.—No let-up is noticed in the demand for tubes: Steel, iron and seamless are each sharing actively in the buying movement. Mills are slow on deliveries, in some cases being several weeks behind. Prices are without change. We quote carload lots, Chicago delivery, as follows:

BOILER TUBES.

	Steel.	Iron.	Seamless.
1 to 1½ inches	40.35	37.35	53.00
1¾ to 2¼ inches	54.35	39.35	40.00
2½ inches	56.35	44.35	43.00
2¾ to 5 inches	62.35	51.35	
6 to 13 inches	62.35	37.35	Up to 4½ inches 50.50

Less than carload lots from store, as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40	35	42½
1¾ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Wire Products.—Demand for nails and wire fencing is very active, especially from the South and Southwest. On smooth wire, deliveries are slow because of the tightly sold condition of producers. Prices are firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Wire nails, $2; painted barb wire, $2.15; galvanized barb wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.10; galvanized staples, $2.40.

Coke.—No change is noticed in the local situation. Demand is heavy and prices firm. Some sellers look for $4 coke in the near future. Connellsville ovens are asking from $3.25 to $3.50 for their 72-hour product, most of them the latter. Shipments of Wise County coke are light because of the car shortage and labor scarcity in that district. This product is quoted at $3.50 ovens, or $5.90 Chicago.

Old Material.—The consumptive demand has shown a material improvement in the week under review. Scrap of one kind or another is in demand from nearly all consumers, and under the brisk trading that is felt prices have advanced from 50 cents to $1 a ton. Several railroad lists were disposed of last week, but all of them were small and the market has not been affected materially by the sales. We have revised our prices, and quote gross tons in the first paragraph as follows:

Old steel rails (4 feet and over)	$16.00 to 16.50
Old steel rails (less than 4 feet)	15.50 to 16.00
Old iron rails	22.00 to 22.50
Relaying rails, subject to inspection	26.00 to 27.00
Heavy melting steel	15.00 to 15.50
Mixed country steel	12.50 to 13.00

We quote as follows net tons:

No. 1 R. R. wrought	17.25 to 17.75
No. 2 R. R. wrought	16.25 to 16.75
Shafting	18.00 to 18.50
Dealers' forge, No. 1	14.50 to 15.00

Wrought pipe and flues	12.50 to 13.00
No. 1 cast, 150 lb. and less	14.00 to 14.50
No. 1 mill	9.00 to 9.50
No. 1 Busheling	12.50 to 13.00
No. 2 Busheling	12.00 to 12.50
Country sheet	8.00 to 8.50
No. 1 boilers, cut	12.00 to 12.50
Boiler punchings	14.50 to 15.00
Iron car axles	23.50 to 24.00
Steel car axles	18.00 to 18.50
Iron axle turnings	11.50 to 12.00
Cast borings	9.00 to 9.50
Mixed borings, etc	9.00 to 9.50
Machine shop turnings	11.00 to 11.55
Railroad malleable	14.00 to 14.50
Agricultural malleable	13.50 to 14.00
Stove plate and light cast scrap	11.50 to 12.00
Old iron splice bars	19.00 to 19.50

CINCINNATI.

Good Tonnage of Small Lots Sold—Market Generally is Quieting Down.

October 18.

Pig Iron.—There continues a fair demand for iron and a moderate inquiry in spite of the heavy sales that have been made in the past few weeks. Most of the business is confined to small lots ranging from 100 to 500 tons, although an occasional inquiry for larger tonnages comes to the front. There is now an inquiry pending for 1,500 tons of Southern iron for delivery in Louisville, and an Indiana concern is in the market for 1,000 tons of mottled iron. A sale of 500 tons of No. 4 foundry to an Indianapolis melter is reported on a basis of $12.50 Birmingham, or $11.50 for No. 4 foundry. Southern iron has sold at $12.50, Birmingham basis, and is still available in a limited way at that price. Some of the largest producers in the Birmingham district are out of the market entirely on the higher grades, and one of the important Birmingham interests has announced $13 as its minimum. Spot iron is exceedingly dull and is offered at $12.50 Birmingham rather freely, but is difficult to place, as most consumers are getting iron on contracts, placed before the advance, which is costing anywhere from $10.50 to $12 Birmingham, so that spot iron at $12.50 is not attractive. In Northern iron, a firmer tone apparently prevails, and so far as Southern Ohio furnaces are concerned, $16 furnace for No. 2 foundry appears to be well maintained. Gray forge is still plentifully offered and is obtainable at $11.75 to $12 Birmingham, but there appears to be little inquiry for this grade at this time. Occasional sales in the East and in Chicago territory are reported at prices above a $13 Birmingham basis, but in this territory $12.50 is being done. There has been a fair tonnage of Virginia iron placed at strong prices, because melters desired this particular brand for their mixtures. The market, in a general way, seems to be quieting down, and melters who have not fully covered their wants through the first quarter of 1906 are inclined to believe that the market has had all of the advance that it seems reasonable to expect, as the heavy buying is over and most consumers have provided for their requirements through the winter, which is the period when disappointments in deliveries, by reason of transportation difficulties, are to be anticipated.

We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$15.75 to 16.25
Southern Foundry No. 2	15.25 to 15.75
Southern Foundry No. 3	14.75 to 15.25
Southern Foundry No. 4	14.25 to 14.75
Southern Foundry No. 1, soft	15.75 to 16.25
Southern Foundry No. 2, soft	15.25 to 15.75
Gray Forge	14.25 to 14.75
Northern Foundry No. 1	17.65
Northern Foundry No. 2	17.15
Northern Foundry No. 3	16.65
Jackson County Silvery, 8 percent	18.65 to 19.15
Southern Charcoal	18.75 to 19.25

Finished Material.—The market continues firm, but no change in prices has been reported. The recent advance in bar iron is well maintained. Plates are showing a firmer tone with improved demand. Bar iron is quoted at 1.70c to 1.75c; steel cars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.48c. We quote black sheets, No. 27, at 2.30c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 12, 2c. Tank plates are firm and sell out of store at 2c for ¼-in. and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.50c from stock and angles at 2c to 2.05c for base sizes.

In merchant pipe the demand is fairly active and the recent schedule is being fairly well maintained by independent mills as well as the leading interests, but there are still some irregularities and quotations on some sizes can be shaded. We quote f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black.	Steel Pipe. Galv.	Guaranteed Wrought Iron Pipe. Black.	Guaranteed Wrought Iron Pipe. Galv.
	Percent.	Percent.	Percent.	Percent.
⅛ and ¼ inches	69.7	53.7	67.2	51.2
⅜ and ½ inches	73.7	61.7	71.2	59.2
¾ to 6 inches	77.7	67.7	75.7	65.7
7 to 12 inches	72.7	57.7	70.7	55.2

Old Material.—There is a fairly good demand and the market holds firm. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$16.50 to 17.00
Cast machine and foundry, net tons	13.50 to 14.00
Old iron rails, gross tons	22.00 to 23.00
Old steel rails, gross tons	16.00 to 16.50
Old short lengths, gross tons	17.00 to 17.50
Old iron axles, net tons	22.00 to 23.00
Stove plate, net tons	10.00 to 10.50
Wrought turnings, net tons	11.00 to 12.00
Cast borings, net tons	8.50 to 9.00
Car wheels, net tons	16.00 to 16.50

Coke.—Prices on foundry and furnace coke continue to advance and a number of the leading operators are out of the market. Spot shipment coke is difficult to obtain. Furnace coke is active and full prices are being paid. We advance quotations in nearly all districts. It appears that ovens have booked so heavily that they are apprehensive of inability to secure transportation equipment to move the coke already sold, and are also disinclined to book up to oven capacity for fear of labor shortage this winter. These features added to the heavy inquiry give the market an extremely strong situation. Prices in the various coke-producing districts are as follows f. o. b. ovens:

†Wise County, Va. Furnace Coke prompt shipment	$2.40 to 2.50 per ton
Wise County, Va. Foundry Coke on contracts	3.00 to 3.25 per ton
Pocahontas Furnace Coke on contracts	2.60 to 2.75 per ton
Pocahontas Foundry Coke on contracts	
*Connellsville Furnace Coke on contracts	2.60 to 2.80 per ton
*Connellsville Foundry Coke on contracts	3.25 to 3.50 per ton
Kanawha Furnace Coke on contracts	
Kanawha Foundry Coke on contracts	2.50 to 2.75 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

*Connellsville Coke inside prices apply to "main line" ovens and not to strictly Connellsville Coke.

CLEVELAND.

Marked Scarcity of Foundry Pig Iron, Which is Being Shipped from Buffalo.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, October 18.

Iron Ore.—Vessels have experienced considerable delay in unloading cargoes at lower lake ports on account of inadequate supply of cars, but, in spite of this, a very large amount of ore is being handled, comparing favorably with the first half of last month. There has been great improvement in the demand for boats to carry grain, but as ore is provided for almost entirely by season contracts, there has been no difficulty in handling the ore movement so far as the vessels were concerned. Ore prices for next year are being informally discussed, some interests favoring an advance of $1 per ton, but

present indications are that the advance will not exceed 50 cents.

Pig Iron.—There is a decided shortage of foundry grades in this city for prompt shipment, as none is obtained from local producers. Some iron has been shipped from Buffalo, where No. 2 plain can be purchased at $15.50 and No. 2X at $16. The freight rate from Buffalo to Cleveland is $1.40, so that the delivered price is $16.90 for No. 2 plain and $17.40 for No. 2X. The usual quotation in the valley is $16 for No. 2, and with a freight rate of 85 cents, the delivered price in Cleveland is about the same as for No. 2 plain, shipped from Buffalo. Bessemer and basic are quoted at $15.50, valley. We quote as follows, Cleveland delivery:

Bessemer	$16.35 to 16.85
No. 1 Foundry	17.50 to 18.00
No. 2 Foundry	16.85 to 17.00
No. 3 Foundry	15.85 to 16.00
No. 2 Southern	16.35 to 16.85
Gray Forge	15.50 to 16.00
Gray Forge, Southern	14.75 to 15.00
Lake Superior charcoal	17.50 to 18.00

Coke.—The advance in coke prices continues, $3 now being asked for Connellsville furnace coke for prompt shipment and $3.50 for foundry. Very little contracting has been done during the past week, as consumers are hoping for lower prices. The car famine is an important factor in the coke situation.

Finished Material.—Competition on tin plate between the principal producer and the independents is very active. Bar iron is firm and in good demand at 1.70c to 1.75c, according to the size and desirability of the order. Local mills are sold up to next July. The anticipated advance in steel bars will have little effect except perhaps to cause specifications on contracts to be sent in more promptly. All the large users of steel bars have covered. The same is true to a large extent as to plates, on which it is expected prices will be advanced. The demand for sheets is excellent, but prices continue irregular.

Old Material.—Consumers have come into the market more actively during the week and prices have strengthened, especially in the heavier grades where advances were general. The impression prevails that the top figures have not yet been reached. The demand continues heavy and dealing is on an extensive scale. We quote Cleveland delivery as follows:

Old iron rails	$22.50 to 23.50
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	17.00 to 18.00
Old car wheels	15.50 to 16.00
Steel boiler plate	13.50 to 14.50
Steel axles	18.50 to 19.50
Malleable iron (railroad)	15.50 to 16.50
Malleable iron (agricultural)	14.50 to 15.50
Heavy steel	16.50 to 16.75

We quote as follows, net tons:

No. 1 R. R. wrought	17.00 to 17.50
No 1 busheling	14.00 to 15.00
No. 1 machine cast	13.75 to 14.25
Iron axles	22.50 to 23.50
Axle turnings	11.50 to 12.50
Wrought turnings (free from cast)	11.00 to 12.00
Grate bars	9.00 to 9.50
Pipes and flues	13.00 to 14.00
Tank iron	11.00 to 11.50
Hoop and band iron	8.00 to 9.00
Sheet iron	7.00 to 8.00
Wrought drillings	11.00 to 12.00
Stove plate	10.00 to 10.50
Cast borings	8.50 to 9.50

PHILADELPHIA.

Advancing Price of Coke the Only Unfavorable Feature of the Market.

October 18

With many dealers out of the market and order books filled up to the capacity of the furnaces for the rest of 1905, attention is temporarily diverted from pig iron proper to the coke situation, which daily causes greater anxiety. If the price of this commodity rises much higher, as it shows every disposition to do, and the ore men and labor show a like disposition to shove up prices for 1906, furnace men may be confronted with losses on business taken at present figures rather than the moderate profit on which they have counted. This possibility makes for great conservatism on the part of producers, and at the same time explains the steady rise in prices. This disposition to unduly advance the cost of the raw materials seems the only cloud on an outlook which otherwise is magnificent.

Pig Iron.—Price changes during the past week have not been sensational, but they reflect the enormous business being done and the great volume of orders and inquiries that still pour in on the producers. Basic and gray forge show the greatest advance, but all grades, it is needless to say, are very strong, and the demand for foundry iron continues unchecked from all quarters. While materially higher prices are still predicted, dealers have so far been successful in curbing any runaway tendencies, and prices are quoted as follows:

No. 1X Foundry	$18.00 to 18.50
No. 2X Foundry	17.50 to 18.00
No. 2 Plain	16.75 to 17.50
Standard Gray Forge	16.00 to 16.50
Ordinary Gray Forge	15.50 to 16.00
Basic	17.25 to 17.75
Low Phosphorus	21.75 to 22.50
Southern No. 2X, rail	16.50 to 16.75
Southern No. 2X, dock	16.00 to 16.25

Finished Material.—The sheet plate manufacturers are expected to meet in New York today to advance the prices of plates and structural material to something like the real figures that have recently prevailed. It is unnecessary to dwell upon the unprecedented activity that now prevails in these branches of the trade. A more active demand for skelp is reported, and for bar iron also. Prices continue nominally as follows, but may be advanced this week: Beams, channels and angles, according to specifications, 1.83½c to 2.50c; refined iron bars, 1.63½c to 1.80c; steel bars, 1.63½c to 1.83c; plates, 1.73½c to 1.80c.

Old Material.—Steel scrap is strong in sympathy with the advancing prices of pig iron, but price changes are slight. The mill men, according to the dealers, still maintain their agreement not to buy at present figures, but a fair amount of business is being done. Prices may be quoted as follows:

Old steel rails	$16.25 to 16.75
No. 1 steel scrap	16.00 to 16.75
Old steel axles	21.00 to 21.50
Old iron axles	25.00 to 26.00
Old iron rails	21.00 to 22.00
Old car wheels	15.75 to 16.25
Choice scrap, R. R. No. 1 wrought	21.00 to 23.00
No. 1 yard scrap	18.75 to 19.35
Machinery scrap	15.50 to 16.00
Low phosphorus scrap	21.00 to 22.00
Wrought iron pipe	15.75 to 16.25
No. 1 forge fire scrap	15.25 to 15.50
No. 2 forge fire scrap, ordinary	12.50 to 13.00
Wrought turnings	14.00 to 14.50
Axle turnings, heavy	14.75 to 15.25
Cast borings	9.75 to 10.25
Stove plates	12.00 to 12.50

NEW YORK.

Big Sales of Pig Iron Continue—Small Steel Shapes In Demand.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., October 18.

Pig Iron.—The most important features of the week have been a marked advance in the price of forge iron, the placing of large tonnages of basic at considerably higher figures and another advance in Southern foundry, owing to the withdrawal of one of the largest producers from the market. Although most of the local agencies have no material for sale, the actual transactions have been well above the normal in volume. There has been a fair run of business in foundry—mostly Northern with occasionally a

stray lot of belated Southern—but the principal interest has been in basic and forge. On Monday Eastern steel companies purchased 12,000 tons of basic and forge iron at $17.25 and $16.25, delivered respectively for shipments covering the next five months. One New York State foundry placed orders for 5,000 tons of foundry. There were a very few sales of Alabama iron, 300 being sold at $13, Birmingham, in the early part of this week. Some 400 tons of Southern charcoal iron were also reported sold by a local representative. A number of small requirements from foundries in the East were provided for. Other large contracts, especially for basic iron, are still pending. Prices are still somewhat irregular, and there are many indications of a growing scarcity of spot, the odd lots which have thus far come to the surface from day to day becoming gradually exhausted. The following are prices at tidewater:

Northern No. 1 Foundry	$17 50 to 18.00
No. 2 Foundry	17.00 to 17.50
No. 2 Plain	16.50 to 17.00
No. 1 Southern Foundry	17.00 to 17.50
No. 2 Southern Foundry	16.50 to 17.25
No. 3 Southern Foundry	16.25 to 16.75
No. 4 Foundry	15.50 to 15.75

Pig Iron Certificates.—The market has been dull but strong, weakening somewhat in the early days of this week. Very few sales were consummated, and there was little disposition to trade. Foundry iron warrants follow:

	Bid.	Asked.
October	15.65	15.75
November	15.65	15.85
December	.....	15.95
February	16.00	16.15

Finished Iron and Steel.—The lighter lines of finished steel are beginning to feel the activity which for many weeks has monopolized the heavy products of the steel mills. The tonnages of rails and structural shapes are still of greatest importance, but an improvement is noted in pipe, sheets and especially in the plate market. A satisfactory amount of business in structural shapes has been released, mostly for railroad bridge work. Several large contracts for office buildings and railroad work remain to be closed. Rails have been as active as could be expected after the enormous tonnages placed during the past few weeks. Among sales reported this week are:

The following are prices at tidewater: Angles, 3 to 6 in. x ¼ in. and heavier, 1.84½c; beams, 3 to 15 in., 1.84½c; tees, 3 x ¼ in. and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine and ordinary fire box, 1.94½c; refined iron bars, 1.60c; soft steel bars, 1.64½c to 1.79c; sheets in carload lots, New York, No. 28, black, 2.40c.

Old Materials.—The market has stiffened in sympathy with the tone in business in other lines of the iron and steel trade. There is an active demand for heavy steel scrap and wrought iron, but cast material continues slow. Rails and car wheels are also in good demand and prices on all material are firm. The following prices are f. o. b. approximately, at tidewater:

Old iron rails	$20.00 to 21 00
Old steel rails, long lengths	15.00 to 15.50
Old steel rails, short pieces	14.50 to 15 00
Relaying rails	22.50 to 23.00
Old car wheels	16.00 to 16.50
Old iron car axles	21.00 to 22.00
Old steel car axles	18.50 to 19.00
Heavy melting steel scrap	15.00 to 15.50
No. 1 railroad wrought scrap	18.00 to 19.00
Iron track scrap	17.50 to 18.00
Wrought pipe	12.00 to 13.00
Cast borings	9.50 to 10.00
Wrought turnings	13.50 to 14.00

No. 6 furnace of the Tennessee Coal, Iron & Railway Co., located at Ensley, broke its record Oct. 10, when it produced 450 tons of iron.

BIRMINGHAM.

Quotations on Pig Iron Advanced, but Little Iron Obtainable for this Year.

BIRMINGHAM, ALA., Oct. 16.—Alabama pig iron manufacturers are still enjoying a steady trade, as far as they can accommodate orders, and a better price is now being obtained for the product. Some iron has been sold in this district above $13 per ton, No. 2, foundry, and such iron as can be purchased in this section, delivery within the next four months, will certainly net $13 per ton at the furnaces. The conditions in this State are most healthy. Those furnace companies entertaining orders for delivery next year are booking a few orders. Some of the larger companies announced a fortnight ago that they were out of the market and they are maintaining their assertion strictly. J. C. Maben, president of the Sloss-Sheffield Steel & Iron Co., just before leaving for a trip to the East, partly on business and partly on personal matters, asserted that his company had sold all of its accumulated or surplus iron and had booked orders which would keep it busy for six months. The Sloss-Sheffield Steel & Iron Co. had the largest stock of accumulated iron in the State a few months ago. This has been wiped off, as far as the company goes, though great stacks of iron are to be seen at the furnaces. This iron only awaits instructions to load and ship. There is a rumor that considerable iron has been purchased in this district for speculative purposes, higher prices being looked for in the near future. Towards the end of the past week, iron wanted before the end of the year was quoted at $13.50 per ton, No. 2, foundry, and it is reported that some few sales were made at that price. There is very little iron to be obtained here for delivery at any price now before the first of the coming year. There is no car shortage reported in this district, and more than one of the superintendents of the iron highways has given out the statement that many box cars and other cars have been placed on side tracks in this district ready to handle the iron and steel traffic. These officials still insist that they will be able to handle the iron and steel products promptly.

The production in Alabama does not show much improvement, if any, in the past fortnight. The blast iron furnaces in operation here are doing nicely. The big furnace at Ensley (Tennessee Coal, Iron & Railroad Co.) is still producing more than 400 tons of iron every 24 hours. This record has simply startled the circles here. The Lookout Mountain Iron Co. has added a fourth stove to its furnace at Battelle and are looking for a larger production right away. Other furnaces are being watched, but so far there has been no improvement in the production to mention.

The following quotations are given: No. 1, foundry, $13.50 to $14; No. 2, foundry, $13 to $13.50; No. 3, foundry, $12.50; No. 4, foundry, $12; gray forge, $11.50; No. 1, soft, $13.50 to $14; No. 2, soft, $13 to $13.50.

The operations at the steel plants at Ensley and Gadsden both show steadiness and an increased output for the month is looked for. There is need for every ton of steel being manufactured. The Bessemer rolling mill (T. C. I. & R. R. Co.) is handling a larger amount of steel now since a night force has been put on in some of the departments. The shipments of the various steel products from the district are large and the goods are going in all directions. Good prices obtain for steel and steel products.

The cast iron pipe trade does not waver in the least and there is no hesitation in the operations at any of the plants. The American Cast Iron Pipe Co. is now receiving bids for the erection of its main buildings at North Birmingham. The plans and specifications for the plant are on exhibition at the office of the company in Birmingham, and contractors are being given an opportunity to bid. The plant will be ready for operation within six months, it is expected.

The Birmingham rolling mills (Republic Iron & Steel Co.) are doing very nicely. The puddling department and guide and bar mills are in full operation and the products are being shipped about as rapidly as they can be loaded. The prospects at this plant are still very favorable and the large number of employes being given employment feel assured that there will be work for many months to come.

The Metal Market.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, October 18.

Metals are quiet this week. Prices remain firm and without change. We quote lake copper in carload lots, 16½c to 16¾c, and 17c to 17¼c for less than carload lots; casting copper, 16c to 16¼c for carload lots, and 16½c to 17c for less than carload lots. Spelter, 6c to 6.05c for carload lots, and 6½c to 7c for smaller lots. Pig tin, 33⅛c to 33½c, according to quantities. Pig lead, 4.95c in 50-ton lots, and 5c to 5½c for smaller quantities. Antimony, 15c for Hallett's and 16c for Cookson's. Nickel, 50c to 60c, according to amount and deliveries.

There is a fair demand for old metals, prices gradually climbing upward. Dealers' selling prices are approximately as follows: Copper wire, 14½c; copper heavy, 14½c; light copper, 13¼c; red brass, 13½c; red brass borings, 11¼c; tea lead, 4c; zinc, 4½c; pewter, 2½c.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., October 18.

Pig Tin.—Owing to doubts of the accuracy or importance of the report of increased production noted last week there has been a sharp rally in the London market with a corresponding effect in local circles, the largest importers and dealers promptly advancing prices. Today's quotations follow. Spot and October, 31¼c to 32¾c; November, 32⅛c to 32⅝c; December, 32c to 32½c; London, £148 12s 6d and £148. Arrivals for the month to date, 1,454; afloat, 2,405 tons.

Copper.—There were few purchasers owing to the scarcity of supplies, but the influence of reported purchases in Europe for shipment to China was distinctly felt. Today's closings follow: Lake and electrolytic, 16⅜c to 16⅝c; casting, 16⅛c to 16⅜c. London's closing today: £72 15d and £71. Exports for the month to date, 5,028 tons.

Lead.—As a result of the greatly increased demand and the continued scarcity of spot supplies producers and dealers have advanced prices on all desilverized grades. Today's closings: 5.00c to 5.05c; St. Louis, 4.92½c; London, £14 18s 9d.

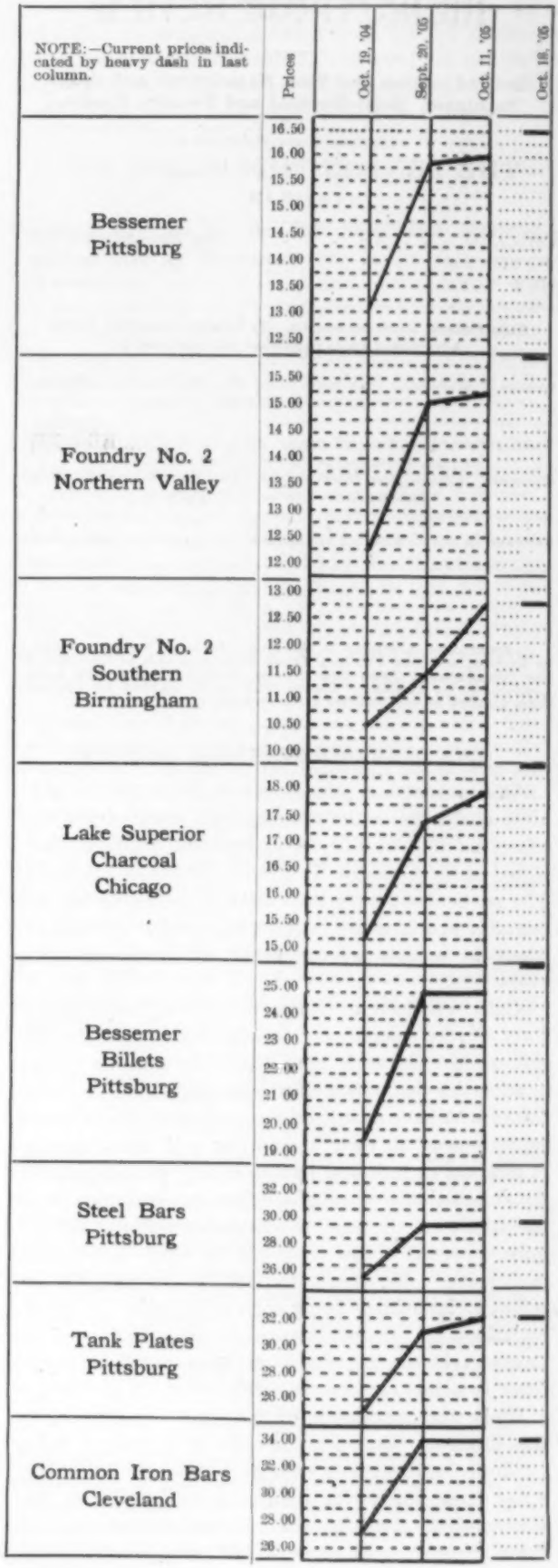
Spelter.—The market continues quiet but strong. Today's closings follow: Spot, 6.00c to 6.10c; St. Louis, 5.85c; London, £28 10s.

Antimony.—The market is weak and prices range lower. Today's quotations follow: Cookson's, 12½c to 12¾c; Hallett's, 12¼c to 12c; other grades, 11c to 12c.

Equipment orders recently placed by the Southern Pacific included 140 locomotives of latest type, six thousand steel flat cars, 120 coaches and baggage cars, eight observation cars and three steamers of 10,000 tons.

The National Stamping Co. will erect a brick factory building, 79 x 206 ft. and four stories high, at Creek street and Debenvoise avenue, Long Island city. It will cost $75,000. The Brooklyn Range Boiler Co. is also planning the erection of a large building at Long Island city.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

OCTOBER 19, 1905

Americans interested in the iron and steel business, visiting in Europe, will find The Iron Trade Review on sale at the office of the International News Co., Breams Buildings, Chancery Lane, London, E. C., England. Copies will be forwarded on request, from London to any address in the world.

THE CARNEGIE TECHNICAL SCHOOLS.

An event of first importance in the world of technical education is the opening this week of the day school of applied science in the first building completed at the Carnegie Technical Schools in Pittsburg. The particular course thus started represents but the merest fraction of the work which will be carried on when the schools are completed, within the next few years.

Those who have in charge the putting into concrete form of the magnificent possibilities created by the gift of Mr. Carnegie have had little time or energy to advertise the work being done or planned, but educators who have examined the work and plans express astonishment at their magnitude and completeness. A new era in technical education will be inaugurated. An impression has gone out that the education is to be largely in the line of manual training. This is quite incorrect. The work will be vastly more comprehensive. The instruction will be the best, the rewards to instructors being such as to invite the greatest talent. A distinct feature in the selection of instructors is the premium put upon practical experience in actual commercial work.

While the importance of the work inaugurated by the Carnegie Technical Schools is far from being generally appreciated, enough was known to bring 1,723 registrations for admission to the classes just started, when but 120 could be accommodated. Of these registered, however, all but 604 were rejected for reasons other than lack of accommodation on the part of the school. The 120 were selected by competitive examinations, and the remainder of the 604 will be eligible as accommodations are increased. But one building has been completed of the many that are under erection and in contemplation.

WILL EXCEED BEST QUARTERLY RECORD.

The exact net earnings of the United States Steel Corporation in the third quarter of this year will be made public after the directors' meeting on Oct. 24. They have been forecasted with sufficient accuracy for comparative purposes at $31,000,000. At this figure they are nearly five million below those of the third quarter in 1902, and nearly a million and a half below those of the third quarter in 1903. The comparison, however, is much more favorable than appears on the surface, inasmuch as since Jan. 1, 1904, net profits are not returned on primary or intermediate operations until the final material has left the control of the corporation. The third quarter of the year is the heaviest for ore mining. In that quarter, for both 1902 and 1903, large profits were reported on ore mined for future consumption. The quarter just expired did not have this advantage. It is a fact that actual earnings during the past quarter were larger than in the same quarter of 1903, and were not much below the actual earnings in the third quarter of 1902. The earnings in the present quarter will easily exceed the best record for a fourth quarter, which was $31,985,759, in the fourth quarter of 1902. With the above estimates for the third and fourth quarters of this year, the earnings of the Steel Corporation for full calendar years will compare as follows:

1901	$ 84,787,597*
1902	133,308,764
1903	109,171,152
1904	73,176,522
1905	117,000,000**

*Nine months.
**Estimated.

HAVING FUN WITH "LITTLE POTS."

Some of the beauties of guessing at statistics are admirably illustrated by two of our esteemed contemporaries in their issues of Oct. 12. One of these journals, which states that in the past it has been so fortunate as to receive reports of blast furnace production from all blast furaces, except one "little pot" and one other stack named Sarah, explains that other interests have decided not to furnish their statistics, but this decision does not interfere with a little guessing game. Our contemporary states that it can no longer publish statistics of stock on hand, but that it is easy to ascertain whether a furnace is in operation or idle, and then make an estimate of production as the product under ordinary circumstances does not vary within wide limits.

The inaccuracy of this statement is apparent to

anyone familiar with blast furnace operations. The only way in which it could be known whether a furnace had been continuously in blast during a certain month would be to station a man at the furnace to watch it every day of the month. The fact that furnaces are frequently banked for a few days always makes guessing in regard to product uncertain—to say nothing of the variation in product, which, under even ordinary conditions, is never the same for any two days, weeks or months. Our contemporary announces that during September there were 274 furnaces in blast, and that their weekly capacity was 445,468 tons or an average of 1,625 tons per week. Another journal, which has also had "many years' experience" (but whether it has heard from the "little pot" and Sarah we are not officially advised) gravely announces that during September there were 296 furnaces in blast, and one might rashly conclude that their capacity would be larger than that of the 274 furnaces, but this is not true, for the 296 stacks had a capacity of only 437,820 tons, or an average of 1,479 tons per week. It is evident that this journal had more "little pots" in its list than did the other esteemed publication.

We might point out various other peculiar features in this game of guessers, but perhaps this brief mention will illustrate how illuminating statistics can be made when they are ground out to suit the ideas of compilers having somewhat conflicting notions.

THE THREE GREAT IRON MAKERS.

Statistics of British pig iron production in the first half of the current year have just been made public, and a comparison can therefore be made of production in the three great iron making countries, as follows, the German figures, originally returned in metric tons, being converted into figures representing gross tons:

Pig Iron Production, tons of 2,240 lb:

United States...	8,173,438	8,323,595	11,163,175
Germany	4,920,405	4,944,848	5,018,006
Great Britain...	4,048,965	4,513,963	4,621,600
Totals	17,142,808	17,782,136	20,802,781

It will be observed that each of the three countries increased its make in each of the successive half years. Germany's total increase was small, while Great Britain showed its larger increase in the second half of this year, the United States on the other hand showing its larger increase in the first half of this year. Of course the iron production of Great Britain never develops the erratic movements observed in the United States. The maximum and minimum production in Great Britain, in the past quarter century, have varied from their mean by less than 17 percent, while with the United States the production in this period has quintupled and there have been variations from one year to the next of more than 20 percent.

Indications rather point to the production of the three countries named above being as heavy, in the second half of the present year, as it has been in the first half. In such case a new record for the production of the world will be established inasmuch as these three countries make more than three-fourths of the world's total.

NAVY YARD NEEDS.

Dredging Contract to Be Let—Steel and Machine Requirements.

(Special Correspondence.)

WASHINGTON, Oct. 18.—A dredging contract for which bids will be opened at the bureau of supplies and accounts of the navy department on Oct. 31 is that for the dredging of 20,000 cubic yards of material from in front of the old stone drydock entrance at the navy yard, Mare Island, California.

Bids will be opened at the same time for ten vertical, direct-acting single-piston steam boiler feed pumps for delivery at the Mare Island Navy Yard and for a number of items in the line of supplies of steel, including 6,606 lb. of mild-steel ribbed floor plates; 14,086 lb. of sheet steel; 12,320 lb. of mild steel; 15,748 lb. of angle steel; 50 tons of pig iron, Salisbury, No. 2; 50 tons pig iron, Niagara No. 2, and 13,000 lb. of galvanized sheet steel.

For the Puget Sound Navy Yard, Washington, bids will be opened on Oct. 31 for two 2-motor electric traveling hoists, each to have a capacity of 6,000 lb. Also for one two-ton three motor overhead electric traveling crane.

On the same date the department will open the bids recently called for for 50 iron or steel tables, each capable of sustaining a weight of 100 lb., which are desired for use as serving tables in the midshipmen's mess hall at the United States Naval Academy at Annapolis, Md. For the Washington, D. C., navy yard estimates will be received for 17,520 lb.—60 bars of hexagon nickel steel. For the New York navy yard one combination machine "Vulcan" for iron work.

Among the ship supply items for which bids will be opened on Oct. 31 are 18,000 lb. of galvanized wrought iron ship spikes; 2,000 lb. of special crane chain; 8,000 lb. of marine ship glue, and two complete sets of diving apparatus.

Will Enlarge Coke Output.

(Special Telegram.)

Pittsburg, Pa., Oct. 18.—Directors of the Pittsburg Coal Co., at a meeting yesterday, ratified the purchase of the Hero coke plant, comprising 30 acres of coking coal land adjoining the Pittsburg company's property, 30 coke ovens and a number of miners' houses. The directors also approved contracts for the building of 187 coke ovens, which are to be finished by Jan. 1; nearly 100 are at Colonial No. 2 plant and about 50 are at Colonial No. 3. Plans were also approved for the construction of a $100,000 fueling dock at Aux Fresnes, on the Sault Ste. Marie river, which the company will erect itself.

The American Bridge Co. has been awarded a $300,000 contract by T. D. Burnham & Co., architects, of Chicago, for the steel required in office buildings in Chicago and San Francisco. The Carnegie Steel Co. will roll the shapes. The contract calls for immediate delivery.

REPUBLIC IRON AND STEEL CO.

Stockholders Meet and Elect Five Directors—The Probable Officers.

(Special Telegram.)

Jersey City, N. J., Oct. 18.—Stockholders of the Republic Iron & Steel Co., at their sixth annual meeting held in this city shortly before noon today, unanimously elected the following directors: Grant B. Schley, George R. Sheldon, E. J. Berwind, S. G. Cooper and John W. Gates. The company has a directory board of 15, only five being chosen at this time. The selections are re-elections, except in the case of S. G. Cooper and E. J. Berwind, who is a director of the Virginia Iron, Coal & Coke Co.

E. W. OGLEBAY.

No action was taken at the meeting today on the election of officers. The directors are to meet tomorrow in New York city for that purpose and for the consideration of the annual report. It is expected that Frank Baackes, at present general sales agent of the American Steel & Wire Co., will be chosen president to succeed Alex. W. Thompson, and that either Charles S. Guthrie or Mr. Thompson will be chairman of the board. E. W. Oglebay, of Oglebay, Norton & Co., Cleveland, was recently chosen a director to succeed the late P. L. Kimbely.

No Advance in Plates.

(Special Telegram.)

NEW YORK, Oct. 18.—Manufacturers of steel plates met in Jersey City yesterday and considered the advisability of advancing prices on structural materials $2 per ton. No decision, however, was reached, definite action being postponed until the next meeting of manufacturers. It is understood that the practice on the part of a number of producers of asking premiums for early delivery will be continued.

The Washington Coal & Coke Co., Star Junction, Pa., has awarded the contract for the building of three hundred additional coke ovens to Murphy & Campbell, contractors, of Connellsville. Work will be started at once. The addition will give the Washington company two plants of five hundred ovens each.

RAILWAY SUPERINTENDENTS MEET.

(Special Telegram.)

Pittsburg, Pa., Oct. 18.—The 15th annual convention of the Association of Railway Superintendents of Bridges and Buildings opened yesterday at the Monongahela House in this city with a discussion of ore docks and other subjects of railroad interest. The convention continues through Saturday.

Malleable Plants Acquired.

The Pressed Steel Car Co., Pittsburg, has secured controlling interests in both the Pennsylvania Malleable Co. and the Central Malleable Co., both with plants at McKees Rocks, Pa., almost adjoining the plant of the Pressed Steel Co. W. H. Schoen was president of both companies, which were capitalized at $900,000; controlling interest is said to have cost the purchaser more than $1,000,000.

The Wellman-Seaver-Morgan Co., Cleveland, has been awarded the contract to furnish the Wheeling & Lake Erie railroad at Huron, O., a complete ore-handling outfit, consisting of four Hulett ore unloading machines, equipped with the Hulett patented excavating bucket. These machines will span four tracks, having cantilever at the rear of the machines and folding boom at the front or water side of the machine. The plant is to be completed by May 1, 1906. The same company has recently closed a number of important contracts for steel works machinery for Great Britain and mining outfits for Nevada and Mexico.

Working Night and Day.—Pawling & Harnischfeger, Milwaukee, builders of electric traveling cranes are working their shops night and day in the effort to keep pace with their orders. The capacity of the erecting shop is being increased by the extension of the girders in order to facilitate the handling of work in this department. Among the orders for cranes that have been entered in the last two weeks are the following: El Paso & Southwestern Railway Co., El Paso, Tex., one 100-ton, 65 ft. span; Oregon Railroad & Navigation Co., Portland, Ore., one 120-ton, 60-ft. span; do., one 15-ton; Chicago City Railroad Co., two 25-ton; Pittsburg Reduction Co., four 5-ton; William A. Engunaim, New York, three 10-ton; Falk Co., Milwaukee, one 25-ton; Havana Central Railroad Co., Cuba, one 10-ton; Reitz Stone Co., one 15-ton; Burlee Dry Dock Co., one 10-ton; Rockford Well Drill Co., one 10-ton. In addition to the foregoing the company has recently installed seven 10-ton cranes in the plant of the American Car & Foundry Co., and 16 5-ton cranes in the works of the McClintic-Marshall Construction Co.

Submarine Iron Ore in Nova Scotia.—A United States consular report states that the Nova Scotia Steel Co. has purchased submarine ore areas on the north of Belle Isle. The deposits are beginning to run short, and it looks as if the supply will last but a few years. The company will now determine whether or not the ore runs out under the sea. One of their tunnels is about 100 ft. from the sea and about the same distance below sea level, and the ore has increased in thickness by nearly 2 ft. since going underground. There is every indication that success will be met with on continuing out under the sea. Should the venture prove a success the company will have a supply for many years, but it will cost $100,000 to prove that the ore is workable.

FOREIGN MARKETS.

MACHINE TOOL BUILDERS TOLD HOW TO EXTEND TRADE.

National Association Meets at New York—No Decision Reached on Important Questions.

The semi-annual meeting of the National Machine Tool Builders, held under most pleasant conditions on the roof garden of the Hoffman House, New York, Oct. 16 and 17, was a success, even though no weighty questions were disposed of. Every member of the association was represented, and the warm discussions which marked the different sessions resulted in a better understanding of conditions which cannot fail to be beneficial. The various committee reports were discussed at length, but except in one or two instances, the association remains uncommitted to any definite decision. The matter of prices was found to lie outside the jurisdiction, or at least the executive field, of the society. The actual price will be determined by the makers of the various types of machine tools. Thus the makers of one type wished the present figures advanced, while those of another type were content with the existing level. No action could be taken affecting the whole.

In the same way the question of variable speed motors for individual drive was left to the discretion of the builder, where it must ultimately remain in any case. The classification of the members into different groups is also still in a progressive state, and will receive further consideration at future meetings.

The election of officers resulted in the following choice: President, Edward M. Woodward, of the Woodward & Powell Planer Co.; Secretary, P. E. Montanus, of the Springfield Machine Tool Co.; treasurer, F. E. Reed, of the F. E. Reed Co.; first vice president, Wm. Lodge, of the Lodge & Shipley Machine Tool Co.; second vice president, W. P. Davis, of the W. P. Davis Machine Co. The next meeting will be held at Atlantic City, N. J.

Sessions of the Convention.

The first session, Monday morning, was devoted to routine business, the reading of the minutes of the previous meeting, the selection of convention committees, resolutions, reports of officers and standing committees and miscellaneous business. A discussion of the conditions of trade filled out the morning until past the hour set for the complimentary luncheon served to the members and guests by a journal devoted to this branch of the trade.

In the afternoon more routine business was transacted and the reports of the committees on "Motor Drives" and on "The Apprenticeship System" occupied the attention of the members. The address of Charles A. Moore was postponed until the evening.

The Banquet.

The banquet at the Hoffman House on the evening of the 16th was the event of the meeting, and Mr. Moore's address on "Conditions and Possibilities of Trade for American Machine Tools Abroad" was the event of the banquet. He urged the necessity of cultivating the foreign market, and his comments upon the very common failure to make use of the opportunities offered were searching and incisive as wit and profound knowledge of the conditions could make them. He said that the excellence of the American-built machine tool had won a reputation everywhere, but that even with this advantage, trade would not come without an effort. Want of enterprise in finding and occupying new fields, and lack of attention to the wishes and prejudices of the peoples of other nations not only reduced present profits, but would, if continued, inevitably result in future loss. Examples and instances innumerable amused and enlivened the diners, and occasionally a pointed thrust struck home. Imperfect and careless packing and marking came in for a volley of scathing remarks, which no one attempted to parry. Mr. Moore spoke of the patience and the enterprise of the Germans, who buy our machinery, study it and derive a profit from markets lying ready for occupation by the American builders themselves.

Fred J. Miller, editor of the American Machinist, in an address on the subject, "Government Manufacturing," spoke of the tools employed in the many shops operated by our Government. This paper will appear in a future issue of The Iron Trade Review.

The Tuesday morning session was given up to the remaining routine business of the convention, to the election of officers, the report of convention committees and to the discussion of the national reciprocity convention held at Chicago, Aug. 16 and 17.

After the closing session the members embarked upon a steamer as the guests of another enterprising journal devoted to the machine trade. A trip around Manhattan island in magnificent October weather concluded the events of the convention.

Those in attendance.

E. P. Alvord, The Hendey Machine Co., Torrington, Conn.
B. F. Barnes, B. F. Barnes Co., Rockford, Ill.
J. S. Detrick, Detrick & Harvey Machine Co., Baltimore, Md.
C. J. Wetsel, Baush Machine Tool Co., Springfield, Mass.
Deaper Machine Tool Co., Worcester, Mass.
P. Blaisdell & Co., Worcester, Mass.
A. C. Newton, Prentice Bros. Co., Worcester, Mass.
F. E. Reed, F. E. Reed Co., Worcester, Mass.
Whitcomb Mfg. Co., Worcester, Mass.
E. M. Woodward, Woodward & Powell Planer Co., Worcester, Mass.
C. H. Norton, Norton Emery Wheel Co., Worcester, Mass.
C. F. Sutton Co., Toledo, O.
Joseph Flather, H. L. Flather, Flather & Co., Inc., Nashua, N. H.
Mark Flather Planer Co., Nashua, N. H.
Binsse Machine Co., Newark, N. J.
Ulrich Eberhardt, Gould & Eberhardt, Newark, N. J.
W. P. Davis, W. P. Davis Machine Co., Rochester, N. Y.
W. A. Wilson Machine Co., Rochester, N. Y.
J. B. Doan, The American Tool Works Co., Cincinnati.
W. T. S. Johnson, Bradford Machine Tool Co., Cincinnati.
H. C. Hoefinghoff, Bickford Drill & Tool Co., Cincinnati.
Fred A. Geier, Cincinnati Milling Machine Co., Cincinnati.
B. B. Quiller, Cincinnati Planer Co., Cincinnati.
Cincinnati Shaper Co., Cincinnati.
Murray Shipley, Dietz Machine Tool Co., Cincinnati.
L. C. Twachtman, Fosdick Machine Tool Co., Cincinnati.
H. H. Klusman, Greaves, Klusman & Co., Cincinnati.
Wm. Lodge, Lodge & Shipley Machine Tool Co., Cincinnati.
R. K. Lehlond, R. K. Leblond Machine Tool Co., Cincinnati.
Rufus King, The King Machine Tool Co., Cincinnati.
A. M. Watcher, The Queen City Machine Tool Co., Cincinnati.
Rahn, Mayer Carpenter Co., Cincinnati.
F. W. Boye Jr., Schumacher & Boye, Cincinnati.
C. F. Hilker, Hamilton Machine Tool Co., Hamilton.
P. E. Montanus, Springfield Machine Tool Co., Springfield, O.
Wm. H. Owen, Owen Machine Tool Co., Springfield, O.
W. D. Woolson, Jones & Lamson Machine Tool Co., Springfield, Vt.
Lewis H. Morgan, The Ridgway Machine Tool Co., Ridgway, Pa.
G. W. Fifield, G. W. Fifield, Lowell, Mass.
Stockbridge Machine Co., Worcester, Mass.
Geo. O. Gridley, Windsor Machine Co., Windsor, Vt.
John Steptoe Shaper Co., Cincinnati.
Builders Iron Foundry, Providence, R. I.
Fairbanks Co., Springfield, O.
S. H. Bullard, D. B. Bullard, Bullard Machine Tool Co., Bridgeport, Conn.

Large Order for Shovels.—The Oliver Iron Mining Co. has just closed a contract for twenty-seven 90-ton steam shovels, for delivery at Duluth early next spring. Of these nineteen will be built by the Marion works, and eight by the Bucyrus company. It is the largest private order for shovels ever given. The company has also ordered, the contract having been placed in New York last week, fifty-five locomotives to be built by the Baldwin and American companies. They will be for switching and hauling in open pit mines, mostly on the Mesabi range. Contracts for a few boilers and other equipment have also been placed from the Duluth office and there are several other large orders to be placed in a short time. The bulk of the new shovels and many of the engines go to Hibbing, where the company will carry on, not only heavy mining, but very extensive stripping operations during the coming year.

DEALING VERY LIGHT IN ALL SECURITIES.

VANDERLIP'S ADDRESS SETS WALL STREET THINKING.

Money Rates Lower—Industrials Share in Irregularity of the Market—Small Selling of the Week.

Irregular dealing, with total sales extremely small and changes in prices mostly fractional and those generally traceable to speculative manipulation, has characterized the market of the past week. Money loosened up considerably, the rate occasionally touching three percent, but dealers have watched with apprehension the tightening of rates in Europe. The effect of Mr. Vanderlip's address before the bankers of the country was most peculiar. His speech was entirely optimistic, except in so far as it voiced a warning against the dangers of speculation with money conditions tense and prices uniformly high. There was nothing new in such a warning. Wall Street already knew the danger, yet when Mr. Vanderlip stated that an outbreak of speculation now "might easily be temporary disaster" through which "prosperity might receive a severe check," prices broke heavily and did not recover until the street had time to digest the address and note that it was really anything but pessimistic. Throughout the week and in fact for some weeks past there has been a tendency to seize upon the slightest unfavorable development, such as the closing of a minor Western bank, and magnify it into an important market feature. Mr. Vanderlip's prosperity statements find special verification in reports from the crop situation and the iron and steel industry. The opinion prevails that the West has obtained enough money to move the crops and that there will not be a return to the high rates of the last month. Industrials during the week shared in the general light dealing. American Locomotive was most active, selling over 60 at one time on reports of changes in the management at the present annual meeting. For the same reason Republic Iron & Steel was much dealt in with a small net advance. Railway Steel Spring lost most of its gain of the week before; Steel Foundries recorded good advances, though with moderate sales and other industrials fluctuated within narrow limits, seemingly from no other cause than speculation.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation, Oct. 9	Closing Quo. Oct. 16	Changes	Date of 1905 Ann. Meet.	Par Value	Capital Outstanding	Dividend		
							Basis	Being Paid	Date Last Div. Dec.
Allis-Chalmers Co	17⅞	17⅝	— ¼	Sept. 7	100	19,820,000	.....	.....	.....
Allis-Chalmers preferred	59⅞	60⅝	+ ⅞		100	16,150,000	7 cum	.....	Feb., 1904
American Can	11	10¾	— ¼	Feb.	100	41,233,300	.....	.....	.....
American Can preferred	72	71½	— ½		100	41,233,300	7 cum	5 Q.	Oct., 1905
American Car and Foundry	38¼	37¾	— ¾	June 29	100	30,000,000	.....	.....	May, 1905
American Car and Foundry preferred	100	100	.....		100	30,000,000	7 n. c.	7 Q.	Oct., 1904
American Locomotive	58½	59⅞	+1⅜	Oct. 17	100	25,000,000	.....	.....	.....
American Locomotive preferred	113⅜	113½	.....		100	24,100,000	7 cum	7 Q.	Oct., 1905
American Shipbuilding	55	57½	+2½	Oct. 4	100	7,600,000	4	4 Q.	Sept., 1905
American Shipbuilding preferred	103¾	105	+1¼		100	7,800,000	7 n. c.	7 Q.	Oct., 1905
American Steel Foundries	10½	12⅝	+2	Oct. 3	100	17,700,000	.....	.....	.....
American Steel Foundries preferred	40	44⅞	+4⅞		100	17,700,000	6 cum	.....	Aug., 1904
Barney & Smith	15	15	.....	June 16	100	1,000,000	.....	.....	June, 1893
Barney & Smith preferred	128	130	.....		100	2,500,000	8 cum	8 Q.	Sept., 1905
Bethlehem Steel	29¾	29¼	— ½	April 4	100	15,000,000	.....	.....	.....
Bethlehem Steel preferred	87½	86	—1½		100	15,000,000	7 n. c.	7 Q.	Aug., 1905
Bullock Electric preferred	113	114	+1	Oct. 1	100	1,000,000	6	6 Q.	Oct., 1905
Cambria Steel	28	28⅞	+⅞	March 21	50	45,000,000	6	3 S. A.	Aug., 1905
Cambria Iron	.....	.....	.....		50	8,468,000	4	4 S. A.	Oct., 1905
Colorado Fuel & Iron	46¾	46	— ¾	Oct. 16	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	28	28	.....	May 25	100	6,068,000	5	.....	Nov., 1902
Crucible Steel	13	13⅝	+ ⅝	Oct. 18	100	25,000,000	.....	.....	.....
Crucible Steel preferred	66	67⅛	+1⅛		100	25,000,000	7 cum	.....	Sept., 1903
Empire Steel	5	6	+1	Feb. 22	100	2,281,400	.....	.....	.....
Empire Steel preferred	35	35	.....		100	2,500,000	6 cum	3 S. A.	Jan., 1905
Fay & Egan	60	60	.....	Feb. 21	100	1,000,000	5	5 Q.	.....
Fay & Egan preferred	118	122	+4		100	1,000,000	7 cum	7 Q.	Aug., 1905
General Electric	179½	180	+ ½	May 9	100	48,256,050	8	8 Q.	Oct., 1905
International Pump	26½	26½	.....	June 6	100	12,282,500	.....	2	July, 1905
International Pump preferred	82	83½	+1½		100	8,850,000	6 cum	6 Q.	Aug., 1905
Lackawanna Steel	.....	80	.....	March 8	100	34,971,400	.....	.....	.....
Lake Superior Corporation	17	17	.....		100	40,000,000	.....	.....	.....
Niles-Bement-Pond	126½	126½	.....	Feb. 1	100	5,000,000	6	6 Q.	Sept., 1905
Niles-Bement-Pond preferred	108	108	.....		100	2,000,000	6 cum	6 Q.	Aug., 1905
Otis Elevator Co	60	60	.....	March 20	100	6,350,300	.....	2 A.	Apr., 1905
Otis Elevator Co. preferred	106	107	+1		100	5,589,500	6 n. c.	6 Q.	Oct., 1905
Pittsburg Coal Co	15	15⅝	+ ⅛	Feb. 11	100	30,135,000	.....	.....	.....
Pittsburg Coal preferred	57⅛	57⅞	— ¼		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	46⅝	46¼	— ¼	Feb. 15	100	12,500,000	.....	3	Aug., 1904
Pressed Steel Car preferred	97	97⅛	+ ⅛		100	12,500,000	7 n. c.	7 Q.	Aug., 1905
Pullman Palace Car	250	252	+2	Oct. 19	100	74,000,000	8	8 Q.	Aug., 1905
Railway Steel Spring	47	43¼	—3¾	March 2	100	13,500,000	.....	4 S. A.	Oct., 1905
Railway Steel Spring preferred	102	100	.....		100	13,500,000	7 cum	7 Q.	Sept., 1905
Republic Iron & Steel	24½	26	+1½	Oct. 18	100	27,352,000	.....	.....	.....
Republic Iron & Steel preferred	93¼	95⅜	+1⅜		100	20,852,000	7 cum	7 Q.	Oct., 1905
Sloss-Sheffield	71¼	70	—1¼	March 15	100	7,500,000	5	5	Oct., 1905
Sloss Sheffield preferred	106	110	+4		100	6,700,000	7 n. c.	7 Q.	Oct., 1905
Tennessee Coal & Iron	86⅝	86⅛	— ½	May	100	22,552,800	.....	4 Q.	Nov., 1905
Tennessee Coal & Iron preferred	.....	.....	.....		100	248,300	8 cum	8 Q.	Nov., 1905
U. S. Cast Iron Pipe & Foundry	40⅛	37⅞	—2¼	June 28	100	12,500,000	.....	1	Oct., 1905
U. S. Cast Iron Pipe & Foundry preferred	97	96⅝	— ⅜		100	12,500,000	7 n. c.	7 ·	Dec., 1905
U. S. Steel	37½	38	+ ½	April 17	100	508,302,500	.....	.....	Dec., 1903
U. S. Steel preferred	104	104⅞	+ ⅞		100	360,281,100	7 cum	7 Q.	Aug., 1905
U. S. Steel 5's	98½	98⅞	+ ⅜		100	463,798,000	5	5 A.	.....
Virginia Iron, Coal & Coke	39½	39¾	+ ¼	Sept. 19	100	8,641,600	.....	.....	.....
Westinghouse Electric	167½	167⅜	— ⅛	June 28	50	20,986,350	10	10 Q.	Oct., 1905
Westinghouse Air Brake	150	149½	— ½	Oct. 3	50	10,990,450	20	20 Q.	Oct., 1905

Colorado Fuel & Iron Co.

At the annual meeting of the stockholders of the Colorado Fuel & Iron Co., held at Denver, Oct. 16, Gould interests were in complete control, and the following directors were chosen: Alvin W. Krech, Edwin Hawley, John H. McClement, Benjamin Nicoll, Willard P. Ward, Winslow S. Pierce, George

J. Gould, E. T. Jeffrey, E. H. Harriman, E. W. Oglebay, Edwin Gould, D. C. Beaman and F. J. Hearne.

The Rockefeller directors who retired were: J. D. Rockefeller Jr., E. Parmelee Prentice, E. T. Gates and Starr J. Murphy. The new executive board consists of George J. Gould, chairman; Winslow S. Pierce, E. T. Jeffrey, Benjamin Nicoll and F. J. Hearne.

The gross earnings from operations for the year are shown by the report to be $18,615,017, an increase of $6,763,687, as compared with the preceding year. The net earnings carried to the credit of income account were $1,474,193, an increase of $1,306,876, as compared with the preceding year. The total net earnings from all sources amounted to $1,922,047. It is explained by the report that this total, after the payment of all fixed charges and sinking funds, "leaves a deficit of $341,922, carried to the debit of profit and loss."

Officers and directors of some fifteen constituent companies, all of which showed a prosperous condition, were elected. The election of officers of the corporation was deferred until the New York meeting of directors this month. It is understood that no changes are to be made.

The Pullman Co.

Gross earnings of the Pullman Co. for the fiscal year ending July 31, are estimated at between $25,000,000 and $26,000,000, an increase over the previous year of perhaps one million. The corporation's surplus is now placed at more than $20,000,000, and in anticipation of the annual meeting, Oct. 19, rumors of an extra cash dividend of 20 percent have been current of late. The capitalization is $74,000,000, and an official of the company is quoted as saying that 15 percent was earned last year; eight percent is now paid. During the fiscal year 1904, the total earnings on the stock were 13.05 percent. The gross in that year was $24,788,729, as compared with $23,120,713 in 1903. The surplus before dividend in 1904 was $9,661,602, and in 1903, $9,417,690. During 1904, $2,318,873 was marked off for depreciation, etc., as against $2,739,313 for the year previous.

Financial Notes.

The net earnings of the American Steel Foundries Co. for September were about $70,000; for the current fiscal year they are estimated at well over $1,000,000.

The Sloss-Sheffield Steel & Iron Co. has applied to the Stock Exchange for permission to list $2,500,000 additional common stock.

The Crocker-Wheeler Co., manufacturers and electrical engineers, Ampere, N. J., has declared the regular quarterly dividend of 1¼ percent.

The National Steel & Wire Co. has declared the regular quarterly preferred dividend of 1¾ percent.

The regular quarterly dividend of 1 percent on American Shipbuilding common is payable Dec. 2.

Despite the increased earnings of American Car & Foundry Co., the idea prevails that dividend on the common stock will be deferred until late in the fiscal year.

The heavy business of the Pressed Steel Car Co. has led to rumors of a resumption of common dividends. The general opinion is, however, that this will not be done until the profits of the current year and the prospects for future business are known.

The American Steel Foundries Co. has called for a further payment of 25 percent of the bonds subscribed.

Net earnings of United States Steel for the year are now estimated at $117,000,000, an increase of 60 percent over 1904, 7 percent over 1903 and a decrease of only 12 percent from the earnings of the banner year of 1902. The exact earnings for the third quarter will be announced Oct. 24.

PENNSYLVANIA'S PRODUCTION.

Statistics Show Iron and Steel Output for 1904 Decreased Over the Previous Year.

The Pennsylvania State Department of Industrial Statistics has issued a statement of the production and value of iron and steel products for the year 1904, showing a decrease in products as compared with the year before.

The figures of the report show that the production of pig iron in the State in 1904 amounted to 7,411,300 gross tons, a decrease as compared with 1903 of 770,350 tons, but as compared with 1896 the gain was 3,384,950 tons. The value of the pig iron output of 1904 was $101,830,467, a decrease of over $29,000,000, as compared with the value of that of 1903. The number of persons employed was 14,087.

Rolled iron and steel made in the State in 1904 amounted to 8,056,306 tons, a loss as compared with 1903 of 329,055 tons. There were decreases in the production of steel rails, structural shapes and cut nails and spikes. Plates and sheets also declined, but there were gains in other branches of production of rolled iron and steel. There were employed in these lines of the industry in 1904 91,146, a decrease of 8,142 from 1903, while the wages amounted to $55,932,427, also a decrease from 1903.

The product of plate, tinned and untinned, in 1904 was 515,162,964 lbs., over 20,000,000 lbs. less than in 1903, the value of the product being $18,504,358. The entire production of tin and terne plate for 1904 was 542,474,201 lbs., against 554,233,702 lbs. in 1903.

HASTE AT THE ISTHMUS.

Panama Commission Buys Wooden Cars for Quick Delivery.

(Special Correspondence.)

WASHINGTON, Oct. 18.—A contract just awarded by the Isthmian Canal Commission is significant as indicative of existing conditions in the purchasing department of this institution. The contract is for 800 40-ton flat cars for use on the Panama railroad, and was awarded to the American Car & Foundry Co., of New York, on its bid of $997 each, delivered and erected at Colon. The contract calls for wooden cars and the officials of the canal commission make no secret of the fact that they would have been inclined to place a contract for steel cars instead of for those of wooden construction had they been able to secure prompt delivery on the steel cars. The canal commission is using every endeavor to expedite work of all kinds and to that end is making promptness in deliveries a first consideration in the awarding of contracts. In the present instance the steel cars would have cost about $250 per car in excess of the wooden cars, but this discrepancy might have been overlooked. The difference in the guaranteed time of delivery, however, was the deciding factor. The Standard Steel Car Co. could not commence deliveries prior to February, and the Pressed Steel Car Co. would not agree to make deliveries under 215 days.

Great improvements are being made in the management of the supplies division of the commission. Mr. David W. Ross, the new general purchasing officer, and who, by the way, is to receive a salary of $10,000 per year, has shaken up things generally and installed a thoroughly practical business system. In the auditing division where the work was so much behind that bills for supplies and equipment were left unpaid for months, there have been reforms whereby all bills are paid within ten days of their presentation.

PERSONAL.

The Allis-Chalmers Co. has appointed O. A. Stranahan sales manager and M. C. Miller assistant sales manager.

President R. C. McKinney, of the Niles-Bement-Pond Co., is in Europe.

J. B. Bartholomew is the new president of the Avery Mfg. Co., Peoria, Ill., filling the vacancy caused by the death of Cyrus M. Avery.

The American Sheet & Tin Plate Co. has appointed G. C. Kimball chief engineer, succeeding Sumner B. Ely, resigned. James Peat has been made assistant engineer.

Noah W. Gray has left the employ of the Cleveland Cliffs Iron Co., Marquette, Mich., and will devote all his attention to the Boyne City Charcoal Iron Co., Boyne City, Mich., of which he is secretary and treasurer.

W. D. Corcoran, manager of the steel plant of Howe, Brown & Co., Pittsburg, has been chosen president and general manager of the Westmoreland Steel Co., Breensburg, Pa. J. H. K. Burgwin is treasurer.

Oscar E. Thompson, of Phoenixville, Pa., has been appointed engineer of the proposed bridge to be built in Lycoming county, Pa., by the State. He will make the plans and specifications.

F. T. DeLong, for the last six years general manager of the Buhl Malleable Co., Detroit, Mich., has resigned to accept the position of sales manager for the Chicago Railway Equipment Co. He will be succeeded by Melvin Henry.

J. W. McCune, for some years in charge of the Sloss-Sheffield Steel & Iron Co.'s Birmingham furnaces, has taken charge of the furnaces of the Woodward Iron Co., Woodward, Ala. He is succeeded by his assistant, Joseph Dunn.

Walter H. Seaver, vice president and sales agent of the National Wire Corporation, has resigned. Herbert Smith, for several years manager of the wire work of Dorman, Long & Co., Ltd., Middlesbrough, England, has been chosen general manager to succeed him.

George W. Perkins, chairman of the finance committee of the United States Steel Corporation, arrived in London Oct. 16, on his way to St. Petersburg. He is supposed to have a mission of large financial import to Russia. Charles R. Flint, who crossed on the same steamer, the Kaiser Wilhelm II, is also on his way to St. Petersburg.

C. J. Burton, for many years connected with Robert Field in the pig iron business in Cincinnati, has severed his connection with the Robert Field sales agency, and joined his father, G. F. Burton, of Springfield, O., in the organization of the G. F. Burton Co., with headquarters at Springfield. The new organization is an Ohio corporation, with an authorized capital stock of $25,000, and will continue the business of dealing in pig iron, coke, molding sand and kindred materials as formerly conducted by G. F. Burton.

William F. Wagner, general manager of Wm. Jessop & Sons, Ltd., in the United States, with Edward L. Hand, who represents them in Philadelphia; E. W. Salisbury, of Warren, Salisbury & Nightingale, their agents in Providence; E. D. Ridgley, their representative in Detroit, and F. W. Babcock, of the Standard Oil Co., resident of Providence, sailed on the Cunard steamer Caronia, Oct. 3, to attend the 282nd annual gathering of the Cutlers Co., at their banquet in Sheffield on Oct. 12. On this occasion Sydney Jessop Robinson, managing director of Wm. Jessop & Sons, Ltd., was installed as master cutler.

HEAVY RAILWAY ORDERS.

Pennsylvania Requirements Larger Than Anticipated—Other Contracts.

Unusually heavy orders for railway equipment have been let during the past week, and from the number of inquiries pending there is to be no let-up in this line of activity. The Pennsylvania requirements are considerably larger than was anticipated. Five hundred locomotives are to be built, half by the company at its Altoona shops and half by a Philadelphia concern. Contracts will also be let shortly for 15,000 freight cars. The Central of New Jersey, recently a purchaser of 3,000 cars, has also ordered 1,000 steel hopper gondolas from the Cambria Steel Co. The Chicago, Rock Island & Pacific has ordered 1,000 cars from the American Car & Foundry Co. Other contracts let during the week include the following: Canadian Pacific and Grand Trunk, 25 locomotives each from the Canadian branch of the American Locomotive Co.; Michigan Central, 15 locomotives to be constructed at the same shops; and Indiana Harbor, 10 moguls from the American Locomotive Co.

The Vandalia lines are soon to place an order for more than 16,000 steel cars, the report being that contracts will be split up among a number of companies to hasten delivery. The New York Central, it is reported, will need 30,000 new cars next year and will place the order at an early date. Other inquiries are numerous and of good size.

The India railroad board has ordered 40 engines and more than 200 cars for the Northwestern railroad. Both Chile and Argentine Republic have placed car orders with the Wason Mfg. Co.

OBITUARY.

Dwight Cushman, manufacturer of turbine water wheels, died at his home in Hartford, Conn., Sept. 29, aged 83.

Edward L. Bartlett, head of the firm of Barlett, Haywood & Co., founders and machinists of Baltimore, Md., died Sept. 29 after an operation for appendicitis.

William Vetinghof, an expert mining draftsman in the employ of the Philadelphia & Reading Coal & Iron Co., died Oct. 9 at his home in Pottsville, Pa., at the age of 68. He prepared the maps for the Reading company's exhibits at the Chicago, Buffalo and St. Louis expositions.

F. H. Klipp, superintendent of the Girard Boiler & Mfg. Co., Girard, O., died Oct. 4, at Kittanning, Pa., as the result of an accident sustained while overseeing work at the Kittanning Iron & Steel Co.'s furnace the previous day. He was born in Lewistown, O., 48 years ago, and followed the boiler business all his life. In 1884 he became one of the organizers of the Enterprise Boiler Co., Youngstown, where he remained until 1899, when he retired to become associated with the Girard Boiler Co. He was married Feb. 16, 1881.

H. Winfield Wyman, of Wyman & Gordon, drop forgers and founders of Worcester, Mass., died at Worcester, on the morning of Oct. 11 of typhoid fever. He was born in Worcester 44 years ago, was a graduate of Worcester Polytechnic Institute, and with L. F. Gordon, a schoolmate, founded the firm, Wyman & Gordon, 20 years ago. He was prominent in business life in his native city and in Cleveland, O. His father is Horace Wyman, of the Crompton & Knowles loom works. With his father he organized the Worcester Storage Co., of which he was treasurer and manager. His widow, Mary Willis Haskell, of Atchinson, Kan., survives him with three children.

CENTRAL PURCHASING AGENCY

May be Established to Let all Contracts for Government Supplies.

(Special Correspondence.)

Washington, Oct. 17.—All manufacturers who sell equipment or supplies to any branch of the United States Government would be affected should any action be taken looking to the establishment of a central purchasing agency for all government supplies as has recently been proposed. The project for the establishment of such a central purchasing agency is one now under consideration by the Keep Commission—headed by Assistant Secretary of the Treasury C. H. Keep, formerly of Buffalo—which was appointed by the president some time ago to investigate the conduct of business in the various government departments at Washington and recommend action looking to the more economical and more expeditious dispatch of business and the adoption of uniform methods in all the various branches of the government.

At present the supplies required by each department are purchased through the medium of its own purchasing agency, each department having a law unto itself as to the plan to be followed in advertising for and opening bids and making awards of contracts. It is claimed that under the present system there is a wide divergence in the prices paid by different departments for the same classes of supplies and in order to eliminate these and other inequalities the Keep Commission is disposed to recommend to the president the establishment of a general purchasing agency which would advertise for bids and contract for all the various supplies required by any branch of the government, shipping all supplies from a central point.

As matters now stand supplies of all kinds, unless specified delivery is stipulated in the contract, are sent to Washington and shipped from the national capital to it is claimed leads to such needless expenditure for freight charges and the new proposition as originally framed contemplates the establishment of a general agency in New York where supplies can be assembled at less cost and from there distributed with a further saving to the points of consumption. Presumably this new plan would not affect transactions covering machine tools, large quantities of iron and steel and other purchases which are now purchased on contracts that call for delivery at the navy yards, arsenals or other governmental plants where they are to be used, but it would affect numerous classes of purchases and particularly those where the government buys supplies in bulk for distribution among a number of offices or plants.

It is expected that the president will during the coming session make a recommendation to Congress for the establishment of a central purchasing agency in accordance with the plan outlined. The proposed amalgamation would require an act of the national legislature, since that body now makes appropriations for each separate department of the Government. Incidentally it may be noted that there is some doubt as to whether Congress will sanction the scheme in its present form. Already, for instance, Chicago manufacturers and business men are coming forward with the contention that Chicago should be chosen as a site for the agency, since it is nearer the center of the country and has advantages over New York in the matter of freight rates and proximity to places of production. It is expected that other cities will follow with similar pleas—each backed by its senators and representatives in Congress, and it will not be surprising if this conflict of interests results in the enforced abandonment of the whole plan or a compromise involving the establishment of general purchasing agencies in several different cities.

BRITISH BUYING IS LIGHT

Owing to Fact that Consumers are Covered—Shipbuilding Active.

(Special Correspondence.)

BIRMINGHAM, ENG., Oct. 3.—During the past week there was a disposition to suspend judgment on the reality of the revival pending quarterday. It is well known that much of the buying has been due to alarmist influences, and the common remark has been, "wait until we apply for specifications. That will be the testing time." Undoubtedly there has been less buying during the past fortnight, but this is mainly due to the fact that most consumers have covered their requirements for weeks or months to come.

Another element of weakness is the heavy stock of pig-iron warrants at Middlesbrough which has exercised a steadying influence. But within the past day or two there has apparently been a renewal of activity in several quarters. On Monday, the 2nd inst., for example, Middlesbrough warrants advanced 1s 3d on the day, bringing the cash price to £2 11s 11d, and this could not be attributable at all to speculative buying. Simultaneously Scotch iron masters withdrew their price-lists owing to heavy bookings and the high price of ore. Another highly significant step was the advance of 10 shillings per ton agreed upon by a meeting of Tube Strip Makers in Glasgow. This has been one of the most severely depressed branches of the trade, in which foreign competition had been very severely felt. A few days before, Scotch steel makers decided, in view of the serious advance in pig iron and other raw material, to raise prices on all classes of steel manufactures 10 shillings per ton.

While on all hands "booming" is deprecated, the upward movement goes steadily forward. The Dowlais Steel Co., which has just booked a large order for steel sleepers for South Africa, has advanced its prices 2-6 per ton. The improvement has also facilitated the settlement of a little labor difficulty at the Brittania Steel Works, Middlesbrough, where the firm has promptly come to an understanding with its workmen on the subject of wages.

Ship Orders Heavy.

On the Wear shipbuilding yards the selling prices, as compared with last year are quite £1 0s 0d higher, standing now at from £6 to £6 5s 0d. Very little now is heard of laid-up ships and orders are being placed with gratifying regularity. Messrs. Constantine Pickering & Co., one of the most important Middlesbrough firms, have just placed an order for three steamers with various builders on Tees side, making five vessels during the present year.

The persistent rumors of the past week, based upon large Russian orders for battleships alleged to be pending, have no doubt stimulated the market. Russian agents, it is said, are already in this country negotiating large orders. Anyhow, British shipbuilders are optimistic on the subject, and claim to be able to replace the Russian navy more rapidly than any other builders. The following are the eight principal ship yards: Messrs. Vickers, Sons & Maxim, Barrow; John Brown & Co., Clydebank; Messrs. Cammell, Laird & Co., Birkenhead; Messrs. Armstrong, Whitworth & Co., Newcastle; Palmer's Shipbuilding Iron Co., Jarrow; Fairfield Shipbuilding Co., Fairfield; Thames Shipbuilding Co., London; and William Beardmore & Co., Dumbarton. In addition to these many smaller firms could supplement the output by building torpedo and other craft. Expectations of Russian orders are based mainly on the contention that ships can be built here far more cheaply, while as to output, our yards have turned out as much as 1,850,000 tons in a year, no less than 400,000 tons being at one time on the stocks. Most of these firms

have armor plate mills at Sheffield. In view of possible orders from Japan, the outlook for British shipbuilding should be cheerful.

Launch of the "Natal."

There was a pretty little ceremony on Saturday, the 30th ult., at the works of Messrs. Vickers, Son & Maxim, Barrow-in-Furness, when the Duchess of Devonshire in the presence of an enormous crowd launched the "Natal," a huge vessel with a displacement of 13,550 tons, a speed of 22½ knots, and a gun power surpassing that of any existing war vessel. Col. T. E. Vickers, C. B., presided at a subsequent luncheon, when the principal toast was, "Success to the 'Natal' and the health of the Duchess of Devonshire." The Duke of Devonshire, whose iron and steel interests are enormous, in replying paid warm compliments to the firm on the large number of battleships and other war vessels turned out. He congratulated Messrs. Vickers on being at the head of one of the most important factors in the promotion of the national security and prosperity. His grace specially mentioned the fact that the firm had designed and built the "Mikasa," one of the most powerful vessels in the Japanese fleet.

Heavy Foreign Orders.

Sir Charles V. Maclaren. M. P., presiding at a meeting of Palmer's Shipbuilding Co., mentioned that at Jarrow they were getting good orders from abroad, in addition to important admiralty work, including the contract for the battleship "Lord Nelson," of 16,500 tons displacement and 1,675 h. p. During the dull time they found Germany a convenient dumping ground for steel bars. A dividend of 5 percent was declared.

The trade improvement is not to be set back by wage troubles, both the Northern and Midland Wages Boards having this week decided to retain present prices during the ensuing two months. The average selling price for the Northern district, as ascertained by the accountants, was £5 18s 11d during July and August, as compared with £5 19s 3d 12 months ago. This is an increase of only 1s 3d on the previous two months.

Among the most active branches of the trade is that of wire production, the demand for this product having lately been extraordinary. This is partly due to the great rapidity with which overhead tramways are being adopted in all directions. One of the biggest wire-drawing firms is that of Messrs. Ryland Bros., Warrington, who for the first time for a long period are now running a triple eight-hour shift covering the 24 hours.

Iron Company in Bankruptcy.

A petition in bankruptcy was filed in the United States court at Cincinnati Oct. 9 against the Field-Evans Iron Co. by the LaFollette Coal, Iron & Railway Co., of LaFollette, Tenn., on a claim of slightly more than $1,000. It is claimed this balance is due for shipments made during the latter part of last year, but the amount is disputed. The stockholders of the Field-Evans Iron Co. held a meeting on Oct. 9, and it is understood the suit of the LaFollette company is the result of a lack of harmony among the stockholders. It will be remembered this concern formerly conducted a general pig iron commission business with general office at Cincinnati, and branches at Pittsburg, Cleveland, Detroit, St. Louis and Chicago, but in October, 1904, the stockholders voted to liquidate and appointed Robert Field as trustee for that purpose. The affairs of the concern are now practically closed, and only two or three claims have not been paid, these being in dispute, and the assets are said to be ample to meet them. The action brought by the LaFollette company will, in the opinion of Mr. Field, have a tendency to hasten matters to a final adjustment without serious effect, as there are so few creditors of the company involved.

COAL TAR PRODUCTS IMPORTED.

Interesting statistics on the production for 1904 of gas, coke, tar and ammonia at gas works and in retort coke ovens are contained in a report by Edward W. Parker recently published by the United States Geological Survey. The total quantity of coal carbonized at gas works and in by-product ovens during the year is estimated at 7,058,157 short tons, almost equally divided between the gas and oven plants. This is a gain of 1,200,000 tons over the previous year. From this was produced almost 35,000,000 cubic feet of gas, over 30,000,000 feet being at the gas plants; 4,716,049 short tons of coke and 69,498,085 gallons of coal tar. Ammonia liquor to the amount of over 50,000,000 gallons and 12,400,000 pounds of sulphate were produced.

The states leading in these lines in order were: New York, Ohio, Massachusetts, Pennsylvania and Michigan in gas; Pennsylvania, Massachusetts, New York, Maryland and Alabama in coke; Massachusetts, Pennsylvania, New York, Ohio and Michigan in coal tar; and Pennsylvania, New York, Ohio, and Michigan in ammonia.

The report comments on the fact that, although we are annually manufacturing more than 50,000,000 gallons of coal tar, we are importing millions of dollars' worth of chemicals obtained from coal tar as a raw material. Little progress has been made in this country in the manufacture of chemical products from this source.

Machinery in South Africa.—C. M. Kittson, Canadian commercial agent for South Africa, reports that the supply of agricultural implements is greatly in excess of any local demand for a long time to come. One Pretoria firm which purchased large quantities at ridiculously low prices from the British Government is exporting them to points as far away as South America. Hitherto, he writes, South African farmers have not, as a rule, been in the habit of fencing their farms, but recently the desirability of doing so has become apparent and consequently Canadian manufacturers of wire fencing are advised to give more attention to this market in view of the probable large increase of the demand. Owing to periodical droughts and the uncertainty of rain falling in many districts boring for water is considerably on the increase, and the demand for appliances for this purpose will greatly increase in the future.

The Star West Mine.—The old Star West mine, on the Palmer range, near Marquette, has long been mined as a lean silicious, Bessemer proposition, and has been operated by Corrigan, McKinney & Co., of Cleveland. Recently they determined to sink a shaft, and this has been done. It is not yet very deep, but a fine deposit of high grade ore running from 62 to 65 percent has been cut and is to be developed at once for mining on a considerable scale. The discovery is of importance and will doubtless have the effect of stimulating exploration in that district, where the ores are in enormous quantity, but have all been lean and very silicious. The Star West is owned by the United States Steel Corporation in fee, as that company bought the land not long ago, subject to the Corrigan lease. The company also has the fee to most of the surrounding tracts, excepting that owned by the Volunteer Iron Co., even though some of these tracts are operated by lessees who are to a certain extent competitors of the corporation, as are the Corrigan firm and the Consumers Ore Co. This latter has the lease of the Richmond, of which the corporation is fee owner. There is a 17-year lease on this mine, and that the corporation bought the property under this lease shows what it thinks of the ore reserves of that section and these mines in particular.

OCCURRENCE OF COPPER, COBALT AND NICKEL IN AMERICAN PIG IRONS.*

BY EDWARD DEMILLE CAMPBELL.

Although copper, cobalt and nickel probably occur in small amounts in most pig irons, they are not usually determined, and it is owing to this fact that so few analyses are found in which these elements are reported. A search through the literature containing analyses of pig iron reveals but 42 analyses in which any of the above elements are given, and in nine cases only are cobalt and nickel together reported.

These analyses, all of which are on European iron, give the percentage of copper in ordinary pig irons as ranging from 0.0 to 0.140, while in one spiegeleisen the copper is given as being as high as 0.310, and 0.390 percent is reported in a sample of ferro-silicon. In six cases mentioned in which cobalt and nickel together are reported, the amount varies from 0.030 to 0.110 percent. In all six cases the pig iron is reported as smelted from ore from Cornwall or from Wales. The amount of copper, cobalt and nickel occurring in European irons, so far as is shown by analyses already published, is given in Table I.

Some time ago samples of pig iron were procured from charcoal or coke blast furnaces situated in various parts of North America, especially in the United States. The samples were procured from those furnaces only which used ore from a limited region, as the object of the work was to determine the extent to which copper, cobalt and nickel occurs in pig iron made from ore found in the different districts.

The analyses of the samples were made under direction of the author, by Messrs. H. P. Ralston and George P. Sweet, to whom he would here acknowledge his indebtedness for the care with which this work was carried out. All analyses were made from two to four times over, and the results quoted in Table II are the averages of closely agreeing figures. The method of analysis employed was not new, being a slight modification of that given in Mr. A. A. Blair's "Chemical Analysis of Iron." A large sample was usually worked upon, and after conversion into chloride, most of the iron was separated with ether. After this separation of most of the ferric chloride with ether, the small amount of iron and manganese remaining in the aqueous solution was precipitated by the addition of an excess of ammonia and bromine. This precipitation was in all cases repeated in order to insure complete recovery of the copper, cobalt and nickel in the filtrate from the hydrated manganese dioxide and the ferric hydroxide. In the united ammoniacal filtrates the copper, cobalt and nickel were precipitated together as sulphides, which were collected and converted to oxides by careful ignition in a porcelain crucible. The combined oxides were then dissolved and converted into sulphates, the copper being then

TABLE I.

No.	Kind of Iron.	Source.	Percent Copper.	Percent Co and Ni.	Authority.
1	Hematite pig	English	0.11	....	Turner's "Metallurgy of Iron," p. 212.
2	" "	"	0.10	....	" " " "
3	" "	"	0.10	....	" " " "
4	Forge	"	0.11	....	" " " "
5	Mottled	"	0.10	....	" " " "
6	Spiegeleisen	Durham, England	0.014	....	Percy's "Metallurgy," p. 534.
7	Hematite pig	Cinderford, Forest of Dean, England	trace	....	" " p. 539.
8	" "	Cinderford, Forest of Dean, England	0.015	....	" " "
9	Mottled pig	English	0.014	....	*Jour. U. S. Assoc. Charcoal Iron Workers*, vol. vi. p. 332 (1885).
10	Manganiferous	Cornish	0.060	0.060	Percy's "Metallurgy," p. 552.
11	"	"	0.045	0.110	" " "
12	"	"	0.064	.....	" " "
13	Best mine pig, cold blast, from clay iron ore	South Wales	.....	0.05	Percy's "Metallurgy," p. 547.
14	Mottled " " " " "	"	.....	0.04	" " "
15	White " " " " "	"	.....	0.03	" " "
16	Best mine pig, hot and cold blast, from clay iron ore	"	.....	0.07	" " "
17	White forge	Germany	0.14	....	*Jour. Iron and Steel Inst.*, 1890, No. II. p. 758.
18	Gray forge	"	0.08	....	" " " "
19	Spiegeleisen	"	0.15	....	*Jour. Iron and Steel Inst.*, 1894, No. I. p. 529.
20	"	"	0.12	....	" " " "
21	"	"	0.19	....	" " " "
22	"	"	0.18	....	" " " "
23	"	"	0.310	....	Percy's "Metallurgy," p. 534.
24	Coarse grained white pig	Eisenerz, Austria	trace	....	*Jour. Iron and Steel Inst.*, 1891, No. I. p. 364.
*25	Fine " " "	"	trace	....	" " " "
26	Unspecified pig	Austria	.....	trace	" " 1896, No. I. p. 419.
27	Gray pig	Friedland, Austria	0.013	....	" " 1898, No. II. p. 474.
28	White pig	" "	0.011	....	" " " "
29	Gray pig	" "	trace	....	" " " "
30	" "	" "	.....	trace Ni	" " " "
31	" "	" "	.....	0.060 Ni	" " " "
32	Low phosphorus	Hungary	0.04	....	" " 1890, No. II. p. 758.
33	White pig	Also Sajo, Hungary	0.035	....	" " 1891, No. I. p. 364.
34	Spiegeleisen	Marseilles, France	0.019	....	" " " p. 363.
35	Ferro-manganese	" "	0.024	....	" " " "
36	" "	" "	0.060	....	" " " "
37	Ferro-silicon	" "	trace	....	" " " "
38	Gray pig	Russia	0.11	....	" " 1901, No. II. p. 451.
39	Ferro-manganese	"	0.03	....	" " " p. 452.
40	Ferro-silicon	"	0.36	....	" " " "
41	Charcoal pig	Ural District, Russia	trace to 0.08	....	" " " No. I. p. 438.
42	Ferro-silicon	" "	0.11	....	" " " "

TABLE II.

No.	Kind of Ore.	Source of Ore.	Fuel used.	Percent Copper.	Percent Cobalt.	Percent Nickel.
1	Mixed limonite, carbonate and hematite.	Nova Scotia	Coke	0.011	0.012	0.015
2	Local hematites	Mexico	Charcoal	0.012	0.009	0.006
		U. S. A.:—				
3	¾ Mesabi, ¼ Vermillion Range	Minnesota	Coke	nil	nil	nil
4	Gogebic hematite	Wisconsin	Charcoal	nil	nil	nil
5	Magnetic concentrates	New York	Charcoal	0.029	trace	trace
6	Salisbury brown hematite	Connecticut	Charcoal	0.018	0.029	trace
7	⅘ Local hematite, ⅕ magnetite	Virginia	Coke	0.169	trace	0.009
8	Local brown hematite	Alabama	Charcoal	0.038	0.048	0.072
9	Native hematite and magnetite	Colorado	Coke	0.039	nil	nil

* A paper presented at the meeting of the Iron and Steel Institute, Sheffield, England, Sept. 26-29, 1905.

electrolytically precipitated in an acid solution and weighed as metal. The cobalt and nickel were weighed together as metal after being deposited electrolytically from an ammoniacal solution. When the cobalt and nickel had been weighed together, they were dissolved and separated by the well-known potassium nitrite method and re-weighed separately, either as electrolytically redeposited metal or as the oxide.

The results of the analyses are summarized in Table II.

Two points of interest are brought out by a study of these results. First, the fact that the two samples, Nos. 3 and 4, made from ores from the Lake Superior district, contain no copper, cobalt, or nickel, although the Gogebic range is comparatively near the great copper-producing district of Lake Superior. The second point relates to samples Nos. 6 and 8. These two irons, it will be noted, are the only ones containing any considerable amount of cobalt or nickel, and both of these irons have gained a reputation for their valuable properties for car-wheel castings. We have no information in regard to the influence of small amounts of cobalt or nickel on the properties of cast iron, and the occurrence of these elements in these two irons mentioned may be a mere coincidence, but it is at least suggestive.

Cement Production Increases.

The production of hydraulic cement in the United States for 1904 was 31,675,257 barrels, valued at $26,031,920, according to the estimates of L. L. Kimball in a recent bulletin of the Geological Survey. This was a gain of 1,776,117 barrels over 1903.

Portland cement was produced in 1904 at 83 plants, with an output of 26,505,881 barrels, valued at $23,355,119. This was a gain in output, but a decrease in value of over $4,000,000. Pennsylvania was the leading producer, with New Jersey, Michigan and New York following in order. The new plant of the Illinois Steel Co. was not completed in time for operation during 1904: its daily capacity is 4,500 barrels. The enormous increase in Portland cement manufacture is shown by the fact that in 1895 less than 1,000,000 barrels were produced.

Sixty-one plants in 1904 turned out natural rock cement, the output being 4,866,331 barrels, valued at $2,450,150, a heavy decrease from 1903 and 1902. New York was the chief producing State.

During the year eight plants manufactured 303,045 barrels of Puzzolan or slag cement, valued at $226,651, against seven plants in 1903 turning out 525,896 barrels, valued at $542,502. Ohio and Alabama each operated two plants.

Cement imports from Europe have decreased more than half during the last five years, and over 99 percent of that annually consumed in the United States is now of domestic production.

Death of Victor M. Knecht.

Victor M. Knecht, a pioneer in the foundry business of Cincinnati and the proprietor of the Phoenix Iron Works of that city, died at 12:40 o'clock on the morning of Oct. 11. The immediate cause of his death was uraemic poisoning. Mr. Knecht was born in Nancy, Department of Meurthe, France, in 1833, and with his parents went to Cincinnati in 1845. He learned the iron molding trade in that city and with a number of his fellow workmen organized the Eureka Foundry, a co-operative enterprise, in 1866. A year later he withdrew from this concern and purchased an interest which soon became a controlling one, in the Phoenix Foundry, with which he was identified to the last. Mr. Knecht throughout his entire business career enjoyed the confidence of his business associates, and his reputation for honest and upright methods in all his dealings was of high order.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the New England Foundrymen's Association was held on Wednesday, Oct. 11. Through the courtesy of the United Shoe Machinery Co. a visit was made to its plant at Beverly, Mass. The members were received by the officials of the company, after which an inspection was made of the plant. A corps of men were on hand properly to direct the throng through the works, which are far famed for their completeness and modern equipment, and explanations were given by the staff of the establishment, which aided a thorough understanding of the systems of work involved. Returning to Boston, each member was presented a beautiful souvenir brush.

Upon arrival in Boston, the members proceeded to the Exchange club, where dinner was served at 6 o'clock. After dinner the usual routine business was disposed of, President John Magee presiding.

Report was received from the committee appointed to canvass for an increased membership and attendance at the meetings and same was accepted as progressive.

The president then introduced Mr. Leonard C. Wason, of the Aberthaw Construction Co., who gave an illustrated talk along the lines of different types of construction for foundries, showing buildings in process and methods of construction. The president also introduced Mr. Frank W. Reynolds, of Lockwood, Greene & Co., Boston, who made remarks pertaining to the same subject. The reading of the papers was followed by discussion.

The committee appointed to prepare appropriate resolutions upon the death of Alva Carpenter reported, and the resolutions were adopted, ordered spread upon the minutes and a copy to be sent to the family.

Those in Attendance:

S. D. Leland, United Shoe Machinery Co.
John Magee, Magee Furnace Co.
F. F. Stockwell, Barbour-Stockwell Co.
D. D. Russell, Jas. Russell Boiler Works.
Henry A. Carpenter, A. Carpenter & Sons Fdy. Co.
L. C. Wason, Aberthaw Construction Co.
Frank E. Shedd, Lockwood, Greene & Co.
Frank W. Reynolds, Lockwood, Greene & Co.
Walter B. Snow, B. F. Sturtevant Co.
L. F. Patterson, United Shoe Machinery Co.
Chas. J. Caley, Russell & Erwin Mfg. Co.
A. F. Corbin, Union Mfg. Co.
I. F. Baker, General Electric Co.
R. W. Clark, Rogers, Brown & Co.
H. W. Fernald, Rogers, Brown & Co.
W. H. Coffin, Springfield Facing Co.
Geo. H. Lincoln, G. H. Lincoln & Co.
H. C. Arnold, A. Carpenter & Sons Fdy. Co.
C. Hitch Jr., American Tool & Machine Co.
H. F. Arnold, American Tool & Machine Co.
W. H. Woodworth, American Tool & Machine Co.
F. W. March, American Tool & Machine Co.
E. A. Tutein, Crocker Bros.
W. H. Bense, Kinsley Iron & Machine Co.
W. S. White, J. S. White & Co.
R. H. Penney, Barbour-Stockwell Co.
J. P. Winlock, Barbour-Stockwell Co.
T. C. Wilson, Barbour-Stockwell Co.
Wm. H. Phinney, Tabor Mfg. Co.
G. H. Carson, Mechanics Fdy. Co.
A. W. Gibby, Mechanics Fdy. Co.
E. C. Peck, United States Graphite Co.
G. R. Wolverton, T. P. Kelley & Co.
W. J. Lapham, Brown & Sharpe Mfg. Co.
E. J. Lyons, Brown & Sharpe Mfg. Co.
Wm. J. Breen, Hugh W. Adams.
C. C. Boyden, Matthew Addy & Co.
W. M. Saunders, Saunders & Franklin, chemists.
E. V. Hazard, Old Colony Foundry Co.
A. J. Miller, Whitehead Bros. Co.
L. A. Colvin, J. A. Colvin Co.
J. J. Blauvelt, New England Butt Co.
Wm. C. Doherty, Doherty Bros.
F. J. Stewart, Jas. Stewart & Co.
G. A. Locke, Smith & Wallace
Pevey Brothers.
John Nelson, *The Iron Age*.
Geo. W. Gibby, Gibby Foundry Co.
O. E. Nutter, Saco & Pettee Machine Shops.
Wm. Harvie, Corwin Mfg. Co.
S. G. H. Fitch, Corwin Mfg. Co.
H. M. Dutton, Mass. Steel Casting Co.
Jas. B. Jordan, Mass. Steel Casting Co.
B. M. Shaw, Walker-Pratt Mfg. Co.

STANDARD SPECIFICATIONS FOR STRUCTURAL STEEL FOR BRIDGES.*

Manufacture, Chemical and Physical Properties.

1. Steel shall be made by the open-hearth process.

2. The chemical and physical properties shall conform to the following limits:

Elements Considered	Structural Steel	Rivet Steel	Steel Castings
Phosphorus Max. Basic	0.04 %	0.04 %	0.05 %
Phosphorus Max. Acid	0.08 %	0.04 %	0.08 %
Sulphur Max	0.05 %	0.04 %	0.05 %
Ult. tensile strength pounds per sq. in	Desired 60,000	Desired 50,000	Not less than 65,000
Elong.: Min. percent in 8 in. (Fig 1)	1,500,000* / Ult. tens str.	1,500,000 / Ult. tens str.	
Elong.: Min. percent in 2 in. (Fig 2)	22		18
Character of fracture	Silky	Silky	Silky or fine granular
Cold bend without fracture	180° flat†	180° flat ‡	90°. d = 3t

* See par. 11. † See par. 12, 13 and 14. ‡ See par. 15.

The yield point, as indicated by the drop of beam, shall be recorded in the test reports.

Retests.

3. If the ultimate strength varies more than 4,000 lb. from that desired, a retest may be made, at the discretion of the inspector, on the same gauge, which, to be acceptable, shall be within 5,000 lb. of the desired ultimate.

Chemical Determinations.

4. Chemical determinations of the percentages of carbon, phosphorus, sulphur and manganese shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt of steel and a correct copy of such analysis shall be furnished to the engineer or his inspector. Check analyses shall be made from finished material, if called for by the purchaser, in which case an excess of 25 percent above the required limits will be allowed.

Plates, Shapes and Bars.

5. Specimens for tensile and bending tests for plates, shapes and bars shall be made by cutting coupons from

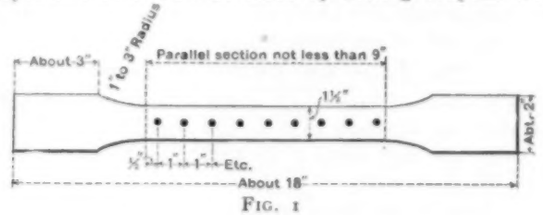


FIG. 1

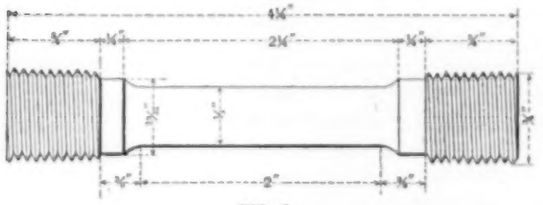


FIG. 2.

the finished product, which shall have both faces rolled and both edges milled to the form shown by Fig. 1; or with both edges parallel; or they may be turned to a diameter of ¾ in. for a length of at least 9 in., with enlarged ends.

Rivets.

6. Rivet rods shall be tested as rolled.

Pins and Rollers.

7. Specimens shall be cut from the finished rolled or forged bar in such manner that the center of the specimen shall be 1 in. from the surface of the bar. The specimen for tensile test shall be turned to the form shown by Fig. 2. The specimen for bending test shall be 1 in. by ½ in. in section.

Steel Castings.

8. The number of tests will depend on the character and importance of the castings. Specimens shall be cut cold from coupons molded and cast on some portion of one or more castings from each melt or from the sink-heads, if the heads are of sufficient size. The coupon or sink-head, so used, shall be annealed with the castings before it is cut off. Test specimens to be of the form prescribed for pins and rollers.

Conditions for and Number of Tests.

9. Material which is to be used without annealing or further treatment shall be tested in the condition in which it comes from the rolls. When material is to be annealed or otherwise treated before use, the specimens for tensile tests, representing such material, shall be cut from properly annealed or similarly treated short lengths of the full section of the bar.

10. At least one tensile and one bending test shall be made from each melt of steel as rolled. In case steel differing ⅜ in. and more in thickness is rolled from one melt, a test shall be made from the thickest and thinnest material rolled.

Elongation.

11. For material less than 5-16 in. and more than ¾ in. in thickness, the following modifications will be allowed in the requirements for elongation:

(*a*) For each 1-16 in. in thickness below 5-16 in., a deduction of 2½ will be allowed from the specified percentage.

(*b*) For each ¼ in. in thickness above ¾ in., a deduction of 1 will be allowed from the specified percentage.

Bending Tests and Full-sized Bends.

12. Bending tests may be made by pressure or by blows. Plates, shapes and bars less than 1 in. thick shall bend as called for in paragraph 2.

13. Full-sized material for eye-bars and other steel 1 in. thick and over, tested as rolled, shall bend cold 180° around a pin the diameter of which is equal to twice the thickness of the bar, without fracture on the outside of bend.

Tests on Angles and Rivet Steel.

14. Angles ¾ in. and less in thickness shall open flat, and angles ½ in. and less in thickness shall bend shut, cold, under blows of a hammer, without sign of fracture. This test will be made only when required by the inspector.

15. Rivet steel, when nicked and bent around a bar of the same diameter as the rivet rod, shall give a gradual break and a fine, silky, uniform fracture.

Finish and Marking.

16. Finished material shall be free from injurious seams, flaws, cracks, defective edges, or other defects, and have a smooth uniform, workmanlike finish. Plates 36 in. in width and under shall have rolled edges.

17. Every finished piece of steel shall have the melt number and the name of the manufacturer stamped or rolled upon it. Steel for pins and rollers shall be stamped on the end. Rivet and lattice steel and other small parts may be bundled with the above marks on an attached metal tag.

Rejections.

18. Material, which, subsequent to the above tests at the mills and its acceptance there, develops weak spots,

*As adopted by the American Society for Testing Materials.

brittleness, cracks or other imperfections, or is found to have injurious defects, will be rejected at the shop and shall be replaced by the manufacturer at his own cost.

Permissible Variations.

19. A variation in cross-section or weight of each piece of steel of more than 2½ percent from that specified will be sufficient cause for rejection, except in case of sheared plates, which will be covered by the following permissible variations, which are to apply to single plates.

20. When ordered to weight.—Plates 12½ lb. per square foot or heavier:

(*a*) Up to 100 in. wide, 2½ percent above or below the prescribed weight.

(*b*) One hundred inches wide and over, 5 percent above or below.

21. Plates under 12½ lb. per square foot:

(*a*) Up to 75 in. wide, 2½ percent above or below.

(*b*) Seventy-five inches and up to 100 in. wide, 5 percent above or 3 percent below.

(*c*) One hundred inches wide and over, 10 percent above or 3 percent below.

22. When ordered to gauge.—Plates will be accepted if they measure not more than 0.01 in. below the ordered thickness.

23. An excess over the nominal weight corresponding to the dimensions on the order, will be allowed for each plate, if not more than that shown in the following tables, 1 cu. in. of rolled steel being assumed to weigh 0.2833 lb.

24. Plates ¼ in. and over in thickness.

Thickness Ordered	Nominal Weights	Width of Plate			
		Up to 75 Inch	75 in. and up to 100 in.	100 in. and up to 115 in.	Over 115 in.
1-4 inch	10.20 lbs	10 %	14 %	18 %	
5-16 "	12.75 "	8 %	12 %	16 %	
3-8 "	15.30 "	7 %	10 %	13 %	17 %
7-16 "	17.85 "	6 %	8 %	10 %	13 %
1-2 "	20.40 "	5 %	7 %	9 %	12 %
9-16 "	22.95 "	4½ %	6½ %	8½ %	11 %
5-8 "	25.50 "	4 %	6 %	8 %	10 %
Over 5-8 "	.....	3⅜ %	5 %	6⅝ %	9 %

25. Plates under ¼ in. in thickness.

Thickness ordered	Nominal Weights Lbs. per square ft.	Width of Plate		
		Up to 50 in.	50 in. and up to 70 in.	Over 70 in.
1-8" up to 5-32"	5.10 to 6.37	10 %	15 %	20 %
5-32" " 3-16"	6.37 " 7.65	8½ %	12½ %	17 %
3-16" " 1-4"	7.65 " 10.20	7 %	10 %	15 %

Inspection and Testing.

26. The purchaser shall be furnished complete copies of mill orders, and no material shall be rolled, nor work done, before the purchaser has been notified where the orders have been placed, so that he may arrange for the inspection.

27. The manufacturer shall furnish all facilities for inspecting and testing the weight and quality of all material at the mill where it is manufactured. He shall furnish a suitable testing machine for testing the specimens, as well as prepare the pieces for the machine, free of cost.

28. When an inspector is furnished by the purchaser to inspect material at the mills, he shall have full access, at all times, to all parts of mills where material to be inspected by him is being manufactured.

Standard Specifications for Steel Axles.

1. Steel for axles shall be made by the open-hearth process.

2. There will be three classes of steel axles which shall conform to the following limits in chemical composition.

	Car and Tender Truck Axles Percent.	Driving and Engine Truck Axles. (Carbon Steel) Percent.	Driving and Engine Truck Axles. (Nickel Steel) Percent.
Phosphorus shall not exceed.....	0.06	0.06	0.04
Sulphur " " "	0.06	0.06	0.04
Manganese " " "	....	0.60	....
Nickel.....	....	....	3.0 to 4.0

Physical Properties.

3. For car and tender truck axles no tensile test shall be required.

4. The minimum physical qualities required in the two classes of driving and engine truck axles shall be as follows:

	Driving and Engine Truck Axles (Carbon Steel)	Driving and Engine Truck Axles. (Nickel Steel)
Tensile strength, pounds per sq. inch..	80,000	80,000
Yield point, pounds per sq. inch	40,000	50,000
Elongation, percent in two inches.....	20	25
Contraction of area percent.....	25	45

Drop Test.

5. One axle selected from each melt, when tested by the drop test described in paragraph No. 9, shall stand the number of blows at the height specified in the following table without rupture and without exceeding, as the result of the first blow, the deflection given. Any melt failing to meet these requirements will be rejected.

Diameter of Axle at Center, Inches.	Number of Blows.	Height of Drop Feet	Deflection Inches.
4½	5	24	8¼
4⅜	5	26	8¼
4 7-16	5	28½	8¼
4⅜	5	31	8
4⅜	5	34	8
5⅜	5	43	7
5⅜	7	43	5½

6. Carbon steel and nickel steel driving and engine truck axles shall not be subject to the above drop test.

Test Pieces and Methods of Testing.

7. The standard turned test specimen one-half inch (¼") diameter and two inch (2") gauged length, shall be used to determine the physical properties specified in paragraph No. 4. It is shown in the accompanying sketch:

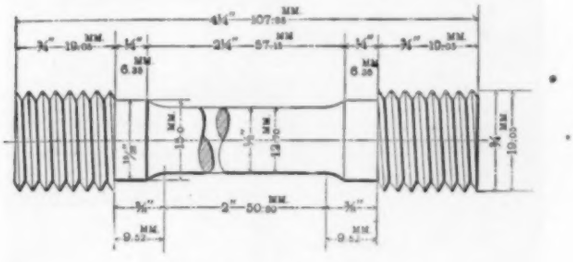
Number and Location of Tensile Specimens.

8. For driving and engine truck axles one longitudinal test specimen shall be cut from one axle of each melt. The center of this test specimen shall be half-way between the center and outside of the axle.

Drop Test Described.

9. The points of supports on which the axle rests during tests must be three feet apart from center to center; the tup must weigh 1,640 lb.; the anvil, which is supported on springs, must weigh 17,500 lb.; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing; and the radius of supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and third blows, and when required, after the fifth blow. To measure the deflection after the first blow prepare a straight edge as long as the axle, by reinforcing it on one side,

equally at each end, so that when it is laid on the axle, the reinforced parts will rest on the collars or ends of the axle, and the balance of the straight edge not touch the axle at any place. Next place the axle in position for test, lay the straight edge on it, and measure the distance from the straight edge to the axle at the middle point of the latter. Then after the first blow, place the straight edge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the



TEST-PIECE.

straight edge at the point farthest away from the latter. The difference between the two measurements is the deflection. The report of the drop test shall state the atmospheric temperature at the time the tests were made.

Yield Point.

10. The yield point specified in paragraph No. 4 shall be determined by the careful observation of the drop of the beam, or halt in the gauge of the testing machine.

Samples for Chemical Analysis.

11. Turnings from the tensile test specimen of driving and engine truck axles, or drillings taken midway between the center and outside of car, and tender truck axles, or drillings from the small test ingot, if preferred by the inspector, shall be used to determine whether the melt is within the limits of chemical composition specified in paragraph No. 2.

Finish.

12. Axles shall conform in sizes, shapes and limiting weights to the requirements given on the order or print sent with it. They shall be made and finished in a workmanlike manner, and shall be free from all injurious cracks, seams or flaws. In centering, sixty (60) degree centers must be used, with clearance given at the point to avoid dulling the shop lathe centers.

Branding and Inspection.

13. Each axle shall be legibly stamped with the melt number and initials of the maker at the places marked on the print or indicated by the inspector.

14. The inspector representing the purchaser, shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture, prior to shipment.

Steel Strips Case Heard by Appraisers.

The board of United States general appraisers gave a final hearing last week to Herman Boker & Co. in the case concerning the question of additional duty on steel strips imported for use in making car seat springs. The entire day was devoted to the taking of testimony, which later on will be written up and placed before the full board for consideration. The government's contention that the strips are subject to extra duty at the rate of 1 cent per pound was defeated in the United States circuit court of appeals last spring, and the present litigation is what is known in customs circles as a "new" case. The board of appraisers will probably formulate a decision early in November.

BOOK REVIEWS.

The Copper Handbook, by Horace J. Stevens. Houghton, Mich. Published by the author. 6 x 9 inches, 882 pages. Cloth. Supplied by *The Iron Trade Review* for $5.

This is the fifth edition of a book, which has now become an annual and a standard concerning all copper mines and copper industries of the world. It was originally started as a book treating of the Lake Superior copper mines; later the mines of other districts of the United States were added, and finally the work was extended to take in the entire world. There are 3,849 mines mentioned, the descriptions ranging from two lines to 12 pages each. In addition to the valuable descriptive matter concerning the producers of copper there are chapters dealing with copper and its history, geology of copper, including native copper, sulphide copper, carbonide and oxide deposits; the chemistry of copper, metallurgy of copper and the uses of copper. These occupy something over 70 pages. There are also two glossaries—one treating of mechanical and mineralogical terms and the other of mining terms.

In case of the larger and more important producers the description of the mine includes the general economic geological conditions. For this reason the book is of especial interest to mineralogists, geologists and mining men.

Mechanics of Materials by Mansfield Merriman, Professor of Civil Engineering in Lehigh University. Tenth Edition, Rewritten and Enlarged. New York. John Wiley & Sons. 518 pages; illustrated. Supplied by *The Iron Trade Review* for $5.00.

The first edition of Professor Merriman's work was published in 1885 and it has gone through nine editions in the intervening ten years. The book has now been rewritten and re-set in order to bring it down to date. It has long been a favorite book in engineering schools on account of its admirable method of treating the subject of mechanics of materials; and it is no less valuable to the practicing engineer as a very handy work of reference.

The subjects treated of as shown in the chapter headings are as follows: Elastic and Ultimate Strength; Elastic and Ultimate Deformation; Materials of Engineering; Cases of Simple Stress; General Theory of Beams; Simple and Cantilever Beams; Overhanging and Fixed Beams; Continuous Beams; Columns or Struts; Torsion of Shafts; Apparent Combined Stresses; Compound Columns and Beams; Resilience and Work; Impact and Fatigue; True Internal Stresses; Guns and Thick Cylinders; Rollers, Plates, Spheres; Miscellaneous Discussions; including Centrifugal Tension; and Flexure of Unsymmetric Loads on Beams; Testing Machines; Specifications for Structural Steel; Mathematical Theory of Elasticity; Appendix including Velocity of Stress; Elastic-Electric Analogies, Miscellaneous Problems and Answers to Problems. The book concludes with twenty tables and a very complete index.

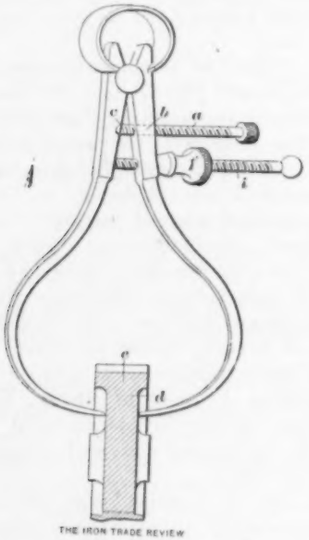
The present edition contains many changes and additions as compared with the previous edition. The number of articles has been increased from 151 to 188; the tables from eight to twenty; the cuts from 85 to 250, and the problems from 222 to 805. The length of each page has been increased eight percent. Smaller type have been used for formulae and problems and the number of pages has been increased from 378 to 518.

As an example of the recent information given in the present edition we notice two new formulae for the

strength of steel in relation to its mechanical composition, based upon Campbell's recent investigations of this subject. Also quite a complete treatment of the subject of reinforced concrete in beams and columns. The work throughout is thoroughly practicable and no more mathematics are used than is necessary for determination of practical results. The work is logically arranged and the style is clear and concise. The author avoids the use of the ambiguous word "strain," substituting "deformation," "elongation" or "compression," as the case may be. We regret, however, that he has defined ultimate limit and yield point as unit stresses instead of actual stresses on bar. There seems to be no reason why this should be defined as unit stress any more than tensile strength, compressive strength, safe load, etc., should be defined as unit stresses. If the elastic limit of a bar of one inch area is 40,000 lb., the elastic limit of a bar of one-half inch area is 20,000 lb.; and the use of the word elastic limit or yield point only in terms of pounds per square inch, or unit stress, is apt to give rise to ambiguity and leaves the figure 20,000 lb. for the one-half inch bar without a name. Johnson defines the elastic limit as the limit within which the body is nearly or not quite elastic. It is unfortunate that the writers on the mechanics of materials do not agree in definitions and do not make the definitions agree with the ordinary use of the language. This is a minor criticism and it is about the only criticism that we have to make of this book which is really remarkable in its excellence.

AN IMPROVED FORM OF CALIPER.

Mr. G. Crocker Smith, of St. Kilda, Victoria, Australia, has invented an improvement on the ordinary type of caliper. This is shown in the accompanying illustration. The improvement consists in adding a small screw (A) to the caliper, which is placed above the regular screw. The end of the screw (A) is free and after the caliper is set in the usual manner this screw is brought into contact at (C)



AN IMPROVED CALIPER.

with the opposite leg of the caliper, thus effectually locking it. The illustration also shows the application of the instrument as a transfer caliper. The thickness of the web (D) is obtained and the screw (A) set up in position. The screw (F) is then released and the caliper taken from the work and closed up until (C) comes in contact with the screw (A). This device is a very quick transfer caliper and one that can be made at slight expense.

INTERLOCKING CHANNEL BAR PILING.

A type of sheet piling made of structural sections, which bids fair to displace the usual wooden piling, is illustrated herewith. This piling is made by the Friestedt Interlocking Channel Bar Co., Chicago. It is made in a number of forms and of different structural sections, some of

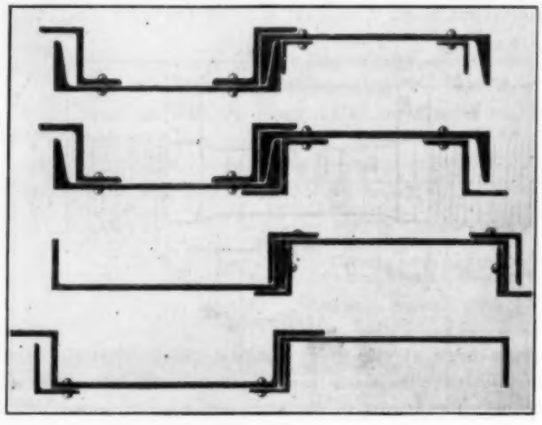


FIG. 1.—FORMS OF INTERLOCKING CHANNEL BAR PILING.

which are illustrated here. The piling is water and quicksand tight and has been used to recover a great many mines where it was necessary to sink shafts through quicksand to a considerable depth. It is manufactured in lengths of from 10 to 60 ft.

An ordinary construction consists of 15 in., 33 lb. rolled channels, the metal being ⅜ in. thick. Each alter-

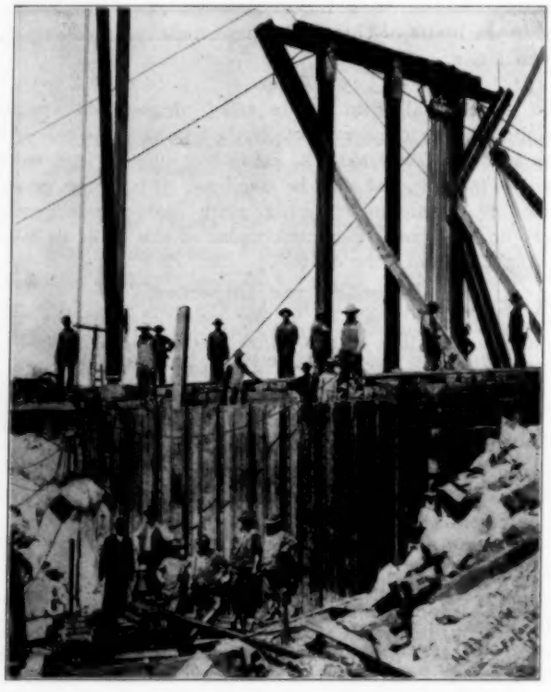


FIG. 2.—PILING IN POSITION AND READY FOR DRIVING.

nate channel has riveted to it two steel Z bars, which form grooves to receive the flanges of the adjacent channels. The Z bars are 3 3-16 x 4⅛ x ⅜ in. The piles are so firmly interlocked that a line of sheet piling will resist heavy pressure without the aid of shoring or brac-

ing at the ends. The joints in water become calked quickly by the accumulation of mud, sand or dirt.

The piling is coming into general use in the construction of core walls for dams. It is also being employed by railways and constractors in the general construction of coffer-dams for bridge foundations. The piling can be

FIG. 3.—CHANNEL BAR PILING USED FOR CONSTRUCTING COFFER-DAMS.

driven, pulled and redriven any number of times and contains a salvage, when of no further use, of about 60 percent.

The accompanying illustrations show a number of applications of this type of piling. Fig. 2 shows the piling set in position and ready for use as employed on the

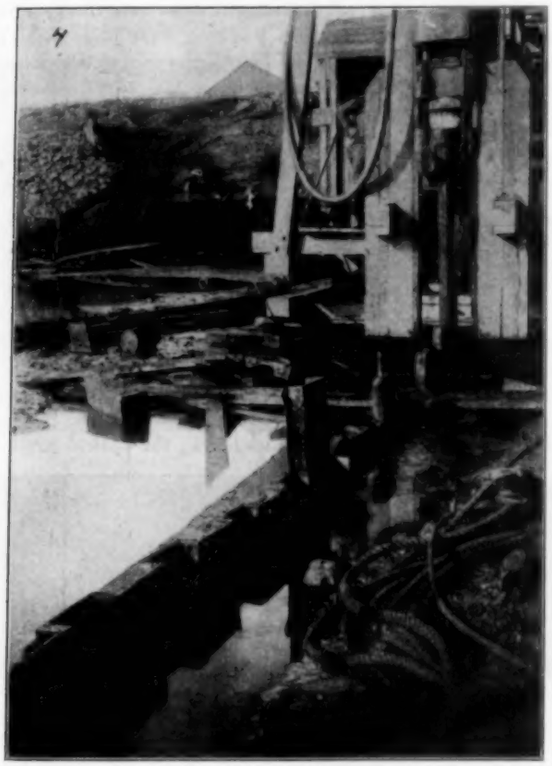


FIG. 4—APPEARANCE OF PILING WHEN DRIVEN.

Missouri, Kansas & Texas railroad in the construction of coffer-dams for bridge piers. Fig. 3 represents the construction of coffer-dams for bridge piers in tide water at Cos Cob, Conn., for the New York, New Haven & Hartford Railway Co. This piling was used in 40 ft. lengths and was driven to bed rock. Fig. 5 shows the driving of a double core wall in the construction of a dam at Big Rapids, Mich., for the Grand Rapids, Muskegon Water Power Electric Co. The piling here was driven through hard pan, coarse gravel and quicksand to bed rock in lengths of from 18 to 45 ft., in order to conform to the undulations of the rock formation. Fig. 4 is a near view of the piling driven in 40 foot lengths

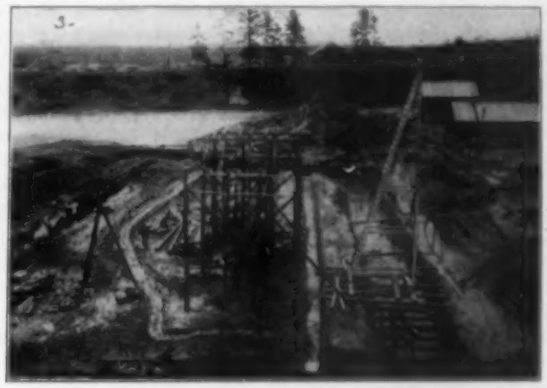


FIG. 5.—CHANNEL BAR PILING IN DAM CONSTRUCTION.

showing the water coming to the surface owing to its being blocked by the piling.

The maker claims that this piling is peculiarly adapted for the purpose of penetrating quicksand, and that this is a particular class of work for which the piling is best adapted.

The company has recently sold to Pickands, Mather & Co., of Cleveland, a large amount of this interlocking channel bar piling, for use in the construction of a shaft for the Syracuse mine near Duluth. This mine has a stratum of quicksand 45 ft. deep. The same company has also purchased piling to drive a shaft at its Bangor mine. The piling in this case will have to penetrate quicksand 75 feet deep. This piling weighs 48 pounds per square foot when interlocked.

The Creation of Draft.

"Although the ultimate object of any means of draft production must necessarily be to create draft or velocity sufficient to provide the required amount of air and to carry off the gases, yet this portion of its work is almost infinitesimal as compared with the demand made for sufficient pressure to overcome the resistance of the fuel and the boiler. In other words, the ability to create sufficient pressure difference is the primary requisite to burning a given quantity of fuel, rather than the ability to move a certain amount of air. Draft-producing apparatus is not, therefore to be based merely upon the total number of cubic feet to be moved per hour, as determined by multiplying the coal consumption by the allowance of air per pound of coal. If this were the case, a low chimney, or a large slow-running fan, would meet the requirements. In reality, the relatively immense resistances of fuel and boiler demand that the chimney or fan shall first be designed to create sufficient intensity of draft to overcome these resistances and to create the requisite velocity. This velocity must be such that, if multiplied by the full area at which it is measured, the product will equal the volume of air necessary for the combustion of the stated amount of fuel. The height of chimney or the diameter and speed of fan necessary to create the draft thus shown to be required having been determined, it is only necessary to make the capacity such as to accommodate the given volume of air."

(From "Treatise on Mechanical Draft," by the B. F. Sturtevant Co., Boston, Mass.)

THE DEPARTMENT OF IRON AND STEEL METALLURGY AT THE UNIVERSITY OF SHEFFIELD*.

BY JOHN OLIVER ARNOLD, PROFESSOR METALLURGY IN THE UNIVERSITY OF SHEFFIELD.

In the *Journal of the Iron and Steel Institute*, 1891, No. 11, p. 93, Mr. B. H. Thwaite ably and interestingly described the metallurgical department of the Sheffield Technical School. Much of this pioneer teaching plant was designated by Mr. Thwaite to the author's general specification. For a period of 12 years the equipment rendered excellent service, and established beyond all doubt that the day had gone by when iron and steel metallurgy could be properly taught with an equipment consisting of an assay laboratory, a blackboard, and some chalk. At the end of 12 years the authorities of the Sheffield University College decided that the small pioneer plant should be replaced by much larger and more up-to-date appliances. The first difficulty presenting itself was the question of a site, as it would be obviously impossible to connect the new practical laboratory with other buildings, because the rattle of the traveling crane and the thud of the hammer would evidently be an intolerable nuisance to people in the adjacent buildings, especially during night heats. This difficulty was overcome by Sir Frederick Mappin, the chairman of the technical committee, who secured and personally paid for an inland site within easy reach of the other laboratories of the department. On this site the unique laboratory about to be described in this paper was built and equipped. Before describing the laboratory itself it may be well to give a brief account of the laboratories to which it is supplementary.

PROF. J. O. ARNOLD.

Chemical Assay Laboratories.

These are four in number, providing accommodation for 102 students working at one time. Many of the benches, however, do double duty, a day student occupying it in the day time and an evening student at night. Included in these laboratories is a specially fitted post graduates' laboratory, accommodating 11 students, and designed for the use of managers and chemists in works who may wish to specialize after graduating. It may be here remarked that the metallurgical department of the University of Sheffield is unique in placing its evening students on the same footing as day students; and it is interesting to note that out of 39 graduates who have won the Associateship in Metallurgy (an examination about equivalent in severity to the average university B.Sc. in honors) 20 were day students and 19 evening students. These facts fully justify a departure of the senate adversely criticized by many university men.

NEW GAS-FIRED CRUCIBLE PLANT.

CUPOLA BLOWER AND MOTOR.

Mechanical Testing Equipment.

The mechanical testing apparatus consists of a 50-ton single-lever Wicksteed machine, with two centers, being thus capable of registering tensile, compressive, transverse or torsional stresses in either 3-inch or 12-inch-ton moments.

BESSEMER CONVERTER.

48-IN. CUPOLA FOR BESSEMER AND GENERAL FOUNDRY PRACTICE.

An alternating stress apparatus works up to nearly 800 alternations per minute, applying a skin stress slightly beyond the elastic limit, the energy necessary to produce rupture being measured by a delicate integrating wattmeter. This machine is capable of making 30 or 40 tests per hour, thus bringing the almost impracticable Wöhler test into the range of everyday works metallurgy. Researches carried out on this machine have indicated that the idea, largely accepted by engineers, that a high elastic limit makes for safety is erroneous.

The Micrographic Installation.

This consists of a battery of six 4-in. polishing blocks driven electrically by a 1-h. p. motor. There are 11 microscopes, including the latest Zeiss photo-micrographic apparatus, illuminated by a powerful Nernst lamp. The dark room is capable of accommodating a maximum of 12 students at one time.

The Pyrometric Installation.

This consists of a central station Le Chatelier pyrometer, which can be connected by means of a switchboard to any of the practical or laboratory furnaces; a Uehling pyrometer connected with the heat treatment muffle to be hereinafter described; a portable photometric dial pyrometer, by Messrs. Baird & Tatlock, Ltd.; the optical pyrometer of Mesuré and Nouel, and the optical pyrometer of Wanner; a portable pyrometer by R. W. Paul; Siemens' copper ball pyrometer; and Seger cones. In connection with the central station Le Chatelier installation is a furnace for measuring recalescence in vacuo, together with a keyboard and an electric chronographic recorder.

HEAT TREATMENT MUFFLE.

FOUNDRY.

Geology and Mineralogy.

Geology and mineralogy are compulsory pure science subjects in the metallurgical course, and the practical

* A paper presented at the meeting of the Iron and Steel Institute, Sheffield, Eng., Sept. 26-29, 1905.

laboratory is equipped with a set of petrological microscopes and rock section cutting and polishing apparatus.

The Practical Laboratories.

These are two in number, the smaller one being the only portion of the plant erected in 1890 which was not dismantled three years ago. In contains a reverberatory annealing furnace, a four-pot coke crucible furnace, and apparatus for the manufacture of white crucibles.

The Chief Practical Laboratory.

The main objects borne in mind in designing this laboratoy were the erection on a manufacturing scale of plant producing steel by the three standard methods of manufacture, namely, crucible, Bessemer, and Siemens steels.

The Crucible Plant.—This consists of a six-pot new form Siemens gas furnace, capable of melting 360 lb. of crucible steel at one time. The economy of fuel in this furnace compared with the old coke system is very great, but it has not yet been decisively ascertained that the gas-melted steel is equal in quality to the coke-melted material.

The Siemens furnace is also of the new form, and is capable of making heats up to 2½ tons. This furnace is also economical owing to the gas retaining the initial heat of the producer, the complete combustion of the tar, and the whole of the regenerative surface being utilized for heating cold air. The ladle is by Messrs. Stevensons, Ltd., of Preston.

The Bessemer Plant.—The plant (made by Messrs. Davy Bros., Ltd., Sheffield) to exemplify the Bessemer process consists of a 1-ton vessel fitted so as to take a very shallow bottom-blown bath, a side-blown heat by the Robert modification, or a surface-blown heat by the modification of Tropenas. The

DRYING STOVE.

22-HORSE POWER ELECTRO-PNEUMATIC HAMMER AND REHEATING FURNACES.

reservoir for the blast consists of a 20-in. underground main 65 ft. long. The blowing engines (made by Messrs. Alley & MacLellan, of Glasgow) have three cylinders 28 in. in diameter with a 12-in. stroke. They deliver 2,750 cu. ft. per minute of uncompressed air, or 2,000 cu. ft. per minute, at a pressure of 5 lb. per square inch. The valves are moved positively, the pistons being single acting, and the cylinders water-jacketed. The lubrication is effected under pressure by an oil pump driven off the crank-shaft. This engine is driven by a 115-h. p. two-phase motor.

The cupola, which serves both for the converter and ordinary cast-iron foundry work, is fitted with double spark-catchers, and is made by the Whiting Foundry Equipment Co., of Chicago. The main shell is 48 in. in diameter, lined up to about 39 in. This cupola has a drop bottom. The blast is supplied by an improved Roots blower, made by Sir B. Samuelson & Co., Ltd., of Banbury, this blower being driven by a 15-h. p. motor. The blast pressure is regulated by means of water resistance.

Other Appliances.

In addition to the main equipment there is a hydrocarbon heat treatment muffle, with 15 sq. ft. of floor space, designed by Mr. Clinch-Jones. This is connected with the Uehling recording pyrometer. There is also a 20-foot-ton falling weight apparatus, the mild steel bed-block of which weighs 2¼ tons, and was made in the laboratory. There is a smith's shop provided with two drills for drilling spoon samples and ingots. There is also a roomy laboratory for color carbons. Steel castings and molds are dried by means of a portable Piftin stove. A notable addition to this laboratory is an electrically-driven pneumatic hammer, by Messrs. W. & J. Player, Ltd., of Birmingham. The weight of this hammer is nominally 7 cwt., but it more nearly approximates ½ ton, and is driven by the blowing engine motor. It is capable of dealing with 4-in. ingots and, striking 100 blows per minute. There is also a coal fire reheating furnace adjoining.

Motive Power.

The motive power throughout is electrical, with the exception of a Cochrane boiler, which works the injector jets of all the furnaces. The current is two-phase, and is supplied by the city corporation. The foundry is spanned by a 4-ton three-motor crane, by Messrs. T. Smith & Sons, of Rodley. The aggregate horse power of the motors in this laboratory is 150. The extent of the experimental operations carried out are exemplified by the fact that during the last session over 40 tons of ingots and castings were made, but unless Government financial support is secured it will be impossible in future sessions to work on so large a scale.

In connection with research work it may be mentioned that since 1889 the staff and students of the metallurgical department have published about 30 original researches.

Runaway Apprentices.

Editor *The Iron Trade Review:*

Sir.—Many complaints are heard from foundrymen on account of the character and skill of the molders available. They claim that many of these molders are incompetent and that they have never served full time and yet demand full pay. One of the complaints most often heard is that the runaway apprentices are allowed to come into the unions as full-fledged workmen, and so demand full wages. A careful analysis of this matter, however, seems to indicate that the manufacturers themselves are, to a large extent, responsible for the runaway apprentice trouble. In their eagerness to get cheap help and to turn out work quickly, many employers induce apprentices to leave other shops and to come to them at somewhat higher wages.

When a boy is put to work he is usually found more or less incompetent, and hence is forced to specialize and frequently is finally laid off. The boy then drifts to another shop and repeats the same operation and finally is given a card. If employers would refuse to have anything to do with a boy who had served a partial apprenticeship and could not give a legitimate reason for quitting his former place, much of this difficulty would be overcome.

It is true that there are cases in which the apprentice boys are imposed upon by the firm to such an extent that they are undoubtedly justified in trying to make a move, but if they are really anxious to learn the trade, they should seek employment somewhere else under instructions, and thus gain a full knowledge of the trade before setting themselves up as journeymen. If the employers and the unions would co-operate in this matter, they could very easily put a stop to the runaway apprentice trouble.

I. D. C.

CARGO SAMPLING OF IRON ORES RECEIVED AT LOWER LAKE PORTS.*

Including the Methods Used in the Analysis of the Same.

BY W. J. RATTLE & SON.

Up to the time of the installation of the clamshell, the sampling of boats was not such a difficult proposition—as at that time, boats were unloaded by shoveling the ore into buckets—the shovelers working down through the ore in the center of each hatch, to the floor, and then working out, naturally gave good faces of ore to sample. With the slowness of unloading, the sampler found better walls of ore to sample and could take more time.

The method of unloading at present varies at nearly every dock—and consequently the method of procuring sample varies accordingly—for example, at the Erie docks, Cleveland, where they have three clam-shells, the boats are clamped out until bottom is reached in all hatches, then the boat is shifted to the Brown bucket machines, and unloading finished by hand. In this case, we aim to sample the ore when the boat has left the clams.

Method of Sampling at Lake Erie Ports.

By the term "Lake Erie Ports" we mean all the docks from Detroit, Mich., to Tonawanda, N. Y. Our method of sampling is the same at each and every dock along the above frontage. The necessary tools used in sampling are a large sized trowel, a hammer, and a wide-mouthed can, with a capacity of about 45 lb. With these the sampler enters the boat when bottom is reached, sampling every hatch in the following manner: Starting from one side, he goes around the walls from bottom to top, taking one-half a trowel full of ore from every 18 in., the distance between his perpendicular sampling being 24 in. When lump ore is encountered, he takes a piece in bulk equal to the amount of fine ore taken on each trowel sample.

When he has filled his can, he dumps this upon a clean floor space in the boat, and proceeds sampling until each hatch has been sampled. After completing his sampling, he goes over his sample carefully, cracking up the lump, so that the entire sample can be homogenuously mixed together.

Our method of mixing the sample on the boat is by shovelling the ore from one pile to another, putting each shovel full on top of the cone until all the ore has been delivered from one pile to the other. After repeating this several times, the pile is flattened out by placing one corner of the cutting edge of the shovel in the top of the cone and circling the pile. This distributes the ore evenly and at the same time flattens the cone. The flattened pile is evenly quartered and the opposite quarters are thrown out. The above mixing process is continued, and if found necessary, the lump ore is crushed finer (this is done when 35 percent or over of the cargo is lump ore), and the last quartering—or about 100 lb. is saved and put into cans.

The amount of ore taken for each sample before mixing and quartering, depends upon the tonnage sampled, and as this varies, it is impossible for us to give you the exact weights, but, as a rule, 45 lb. to 55 lb. is taken from each hatch. The last two opposite quarters are taken to our crushing and drying house on the docks, weighed and dried at 212°; it is again weighed when dry and the difference is the amount of moisture in the cargo.

The sample is then taken and crushed in a Gates crusher, thoroughly mixed as described above, and about 10 lb. to 15 lb. is sent by express to our laboratory for analysis—the sampler keeping in reserve one-half of the last quartering—so that we can call for this should anything happen to the portion shipped.

The advantage, in our opinion, of having these drying and crushing plants on the docks is that a larger sample can be mixed in the dried and crushed state, better than the wet ore as it comes from the boat. Determining the moisture at the docks avoids all accidents that might happen to an undried sample in shipment and gives the proper percentage of moisture in each cargo on its arrival at the unloading dock.

Conclusion.

In summing up the question of sampling all grades of iron ores that are delivered at lower lake ports, it is a difficult matter for us to state all conditions and variations that occur in this business. As a general rule no two boats are unloaded under exactly the same conditions, and no two cargoes of the same ore present the same surfaces, so it is impossible for us to instruct our samplers along any one general rule for sampling, other than those given above, which embrace, in a measure, the fundamental principles of sampling that we have adopted.

We believe firmly in large samples and endeavor in all cases to take them. By the term "Large Samples," we mean 300 lb. to 1,500 lb. to be taken for a sample. Of course, the amount depends upon the tonnage sampled, but roughly figuring the amount, we should say one-quarter of a pound per ton, this giving a sample that is a representative one.

Before the docks installed the present fast unloading machines, we used to take three rounds for each sample—sampling the ore in the boats when one-quarter unloaded and again when one-half out and a third time when three-fourths out—mixing all three samples together for our final sample, but now the time required for unloading is so short that three rounds is entirely out of the question. We believe and have proven beyond a doubt that one large sample taken when the boat is about one-half out gives the proper analysis of the ore.

Preparation of Sample on Arrival at Laboratory.

The samples received at our laboratory having been dried at the docks, need no further drying and are run through a crusher that crushes them up until the ore will pass through a 15-mesh sieve. After crushing the sample, it is mixed on oil cloth by rolling and also by pouring the ore from one pile to another; opposite quarters being taken and mixed as above, until about 5 oz. are left. This is placed on a chrome steel plate and bucked down until all the sample passes through a 100-mesh sieve and thoroughly mixed by rolling. About 1 oz. of this ore is dried in a water bath at 212° F. placed in a bottle and corked tightly and allowed to cool. From this dried sample, all determinations are made.

We submit below the methods used in our laboratory for analyzing an iron ore and those that are accurate and at the same time rapid.

Iron Determination.

Weigh ½ gram of ore into No. 0 beaker, dissolve in hydrochloric acid with the addition of a small amount of stannous chloride, reduce with stannous chloride while hot; transfer to No. 4 beaker, add 10 to 15 CC mercuric chloride and dilute to about 400 CC; add 10 to 15 CC manganese sulphate mixture and titrate with permanganate. Mercuric chloride is a saturated solution and manganese sulphate mixture, we make as follows: Dissolve 800 grams in 5,550 CC water, add 1,650 CC phosphoric acid and 1,600

* Abstract of a paper presented at the meeting of the Lake Superior Mining Institute, Menominee Range, October, 1905.

CC sulphuric acid. Permanganate is made to have 1 CC equal 1 percent, using ½ gram of ore.

Phosphorus Determination.

Dissolve 4 grams of ore in hydrochloric acid, evaporate to 5 or 10 CC, add 40 CC nitric acid concentrated; evaporate to about 15 CC, dilute and filter; add ammonia until it sets to stiff jelly, then add a few CC in excess. Redissolve with nitric acid, heat to 85 C and precipitate with molybdate solution, made as follows: Dissolve 400 grams molybdic acid in 1,600 CC ammonia, 96 specific gravity and add to 6,000 CC nitric acid, 1.20 specific gravity. Add 40 CC of this solution and shake five minutes and let settle; filter, wash with a solution of ammonium sulphate (25 grams of the crystals, 50 CC sulphuric acid, 2,500 CC water). Dissolve, precipitate in flask with ammonia (1 part ammonia, 3 of water); wash filter twice with water; add 10 grains mossy zinc and 80 CC sulphuric acid (1 part sulphuric acid, 3 parts water); heat 15 minutes, filter through cotton, wash with water and titrate with permanganate, using same solution as used for iron determination—viz. 1 CC equals 1 percent iron on ½ gram of ore. Multiply number of CC used by 0.2035—result is phosphorus.

In ores which retain some of the phosphorus in the residue, this is ignited over the blast for about five minutes in crucible; then transferred to beaker and boiled with 10 CC, 1.20 specific gravity, nitric for five minutes and filtered into main solution.

Silica.

Weigh one gram of ore, dissolve in hydrochloric acid, add a few drops of nitric acid and evaporate to dryness; take up in hydrochloric acid, filter. Burn off filter in platinum crucible and fuse with carbonate of soda. Dissolve in weak hydrochloric and evaporate to dryness. Moisten with hydrochloric acid, add hot water, filter, wash with hot water and weak hydrochloric, ignite in crucible and weigh as silica.

Manganese.

Dissolve ½ to 2 grams of ore in hydrochloric, add 5 to 10 CC sulphuric acid, evaporate until fuming freely; cool, dissolve in water, transfer to ½ liter flask, precipitate iron with zinc oxide suspended in water, dilute to mark and filter; measure off 2 portions of 200 CC each and titrate each portion. Multiply number of CC used by 0.1473 and divide by number of grams represented in solution. The result is manganese.

Alumina.

Dissolve 1 gram ore in hydrochloric, evaporate to dryness, take up in hydrochloric, filter, fuse residue; dissolve fusion in weak hydrochloric, evaporate to dryness, moisten with hydrochloric, dissolve in hot water, filter into first filtrate, neutralize with ammonia, add 3 3-10 CC hydrochloric, dilute to 450 CC; add two grams sodium phosphate in solution, stir until solution is clear, add 10 grams hyposulphite of soda and 15 CC acetic acid 30 percent; let stand 15 minutes, then boil 15 minutes, filter, wash with hot water, dry, ignite and weigh as aluminum phosphate.

Lime and Magnesia.

Dissolve 1 gram of ore in hydrochloric, evaporate to dryness, redissolve in hydrochloric, dilute, filter, fuse residue with sodium carbonate, dissolve in weak hydrochloric, evaporate to dryness, cool, moisten with hydrochloric, dissolve with water, filter and wash into first filtrate, heat to boiling, precipitate iron with ammonia, filter while hot, wash several times with hot water, add a few CC of ammonia to filtrate, heat to boiling, add about 10 CC hot ammonium oxalate, boil five minutes, let settle, filter, wash with hot water. After thoroughly washing beaker and precipitate, transfer precipitate to beaker in which precipitation was made; wash filter with weak sulphuric acid; then add 15 CC concentrated sulphuric acid, heat to 70 degrees C and titrate with permanganate used for iron determination, 1 CC equals 0.005 grains iron. Multiply result by 0.2500. Result is oxide of lime.

Magnesia.

Cool, filtrate from lime; add 10 CC concentrated solution of sodium phosphate and ammonia—equal to about 1-10 the bulk of solution; stir well, let stand in a cool place over night, filter, wash with 10 percent ammonia, ignite in porcelain crucible and weigh. Multiply weight by 0.36036. Result is magnesia.

Sulphur.

Dissolve 3 grams of ore in aqua regia, evaporate to dryness, take up in hydrochloric, evaporate a second time, take up in hydrochloric and filter. Precipitate with barium chloride while hot, let settle and filter; wash with cold water and weak hydrochloric, ignite and weigh as barium sulphate. It is always best to test your acids, and if sulphur is found, determine amount and deduct from results.

Loss by Ignition.

Weigh 1 gram of ore in platinum crucible, heat over blast lamp about five minutes; cool and weigh; difference is organic and volatile matter.

More About the Black Sands.

Editor *The Iron Trade Review:*

Sir.—I have read your report of Dr. Day's views of the use of Pacific Coast black sands as iron ore. I have also read the communication of Mr. Horace Winchell in your issue of Oct. 12 pointing out what he considers the obstacles in the way of the use of these sands in the blast furnace. As a man of science and not of practice, Dr. Day may well be pardoned for making his statements in a general way, but any man of mining experience knows that each proposition is a problem within itself. As to delivering ore at the blast furnace for $1 a ton, that depends upon where the ore is and where the furnace.

Mr. Winchell ignores entirely the use of magnetic concentration, without which no iron sand proposition could be entertained for a moment. With magnetic concentration it is not, "somewhat difficult of separation from garnets, staurolites and other heavy silicates." In fact, the magnetic concentrator ignores all questions of gravity or shape or size of the grains, the only point of interest being, are the particles magnetic or are they not? Or, taking the view that all things are magnetic and differ simply in degree of magnetic permeability, then the only question is, the strength of your magnetic field and the permeability of your grains.

No iron ore in the world is more free from sulphur and phosphorus than beach sands. Their main objectionable ingredient is titanium, and it depends entirely how the titanium is held as to whether it is removable or not. If held as ilmenite in separate grains, it is removable by varying the strength of the magnetic field, for while ilmenite is magnetic it is less so than magnetite.

Another thing as to titanium; it depends entirely upon how your smelting is done as to whether the titanium is objectionable or not, or is not a positive advantage to a certain extent.

I have made steel from several sample lots of Pacific Coast black sand concentrates, found nothing objectionable in them and better steel cannot be made.

MARCUS RUTHENBURG.

Niagara Falls, N. Y., Oct. 13.

VERY BUSY

Are Machine Tool Builders of Cleveland—Numerous Foreign Orders Being Received.

As the center of the iron industry and the home of a tremendous and increasing machinery business, Cleveland's manufacturing trade is in excellent condition. It may almost be said to be booming at the present time. Concerns manufacturing and selling various machine tools, punches, shears, drills, machine shop appliances and hardware are uniformly busy to an unusual degree. There seems to be no immediate prospect of a let up and and reassuring advices from various directions confirm the local situation. Many new buildings are being erected to take care of the increasing business and considerable buying of equipment has been done and will probably continue.

The Cleveland Automatic Machine Co. is very busy turning out automatic machine tools from very small sizes up to 6 in. Seventy-five machines have just been completed, 294 are now being built and new orders are at hand calling for 163 additional machines. While extremely busy, the company does not find it economical to run a night shift, but is working 55 hours per week regularly. Present business amounts to $150,000, about half of which is foreign. A new 1905 model machine of the largest size is under construction and will be brought on the market as soon as the demand seems to require. It is similar in most respects to previous machines except that it can handle a larger range of work. A new 28-in. Gray planer has been set up recently and a new Gisholt machine. The planer has given splendid satisfaction, causing comment when it was found to be but 4-1000 of an inch out on the table after being set up. The company is extending the use of automatic machines in its own shop on lathe work up to 6 in. very rapidly and finds a splendid economy resulting. A great number of jigs are used, some $50,000 worth having been made this year, giving the company about $150,000 worth of those tools. High speed steel has proved to be a money saver on planers and automatic machines, it being estimated that a $30 planer tool pays for itself in a month. The year of the company has just ended and an inventory has just been completed.

The Standard Tool Co. reports a healthy growth in its trade and a quantity of work amply sufficient to keep the entire plant busy turning out drills, dies and small tools. A brick addition, three stories high and about 100 x 60 ft., has just been completed and is now being used to relieve the already large machine shop facilities.

The trade of the National Acme Mfg. Co., has been booming since Jan. 1. February was the largest month the company had had up to that time. March fell off somewhat, but the returns from April exceeded the February record. The company at present has a large foreign order ready for shipment, and a new stock room and warehouse has just been erected.

The Parish & Bingham Co. has been making some improvements in its power plant. The sheet metal stamping business is requiring the full capacity of the works.

The Cleveland Punch & Shear Works Co. reports a good business, though prices are quoted as somewhat slow in responding to the prevailing prosperity. The opinion seems to be that the tardy upward movement of pig iron and raw steel products influence the prices of the finished materials unfavorably and this company finds its line of punches, shears, dies, etc., on the market at somewhat lower figures than present conditions would appear to warrant. The company has just issued an elegant new catalogue, described in an earlier issue, one phase of its recently inaugurated methods for reaching the buyer.

The Acme Machinery Co. is working overtime in every department and has among other things about completed a $30,000 order for a Canadian railroad. The company is working on some new ideas for some of its machines, details of which may be expected in the near future. It has completed plans for a four-story, with basement, addition to its plant. Construction will be started at once on the building, which is to be of brick and steel, and the company hopes to have it ready for occupancy early in 1906. The four-story addition built during the past summer afforded only temporary relief to the crowded condition of all departments and the present capacity will be more than doubled when improvements now under way have been carried out. The company has recently booked substantial orders for its "Acme Automatic" multiple spindle screw machine and products in Europe, Asia and South America.

The Cleveland Twist Drill Co., manufacturing twist drills exclusively, finds business extremely good, having all it can do. The prospect is that the present condition will continue for a year, certainly throughout the winter. A member of the firm just returned from the East, states that reports from that section are very flattering.

The Cleveland City Forge is doing a very fair business. The turnbuckle department has regained the activity lost in the depression of a year ago and is doing very well. The forging business seems to be somewhat slower than surrounding conditions would lead one to expect.

The McGeorge Mfg. Co. has been organized in Cleveland by John McGeorge, Harold McGeorge and Herbert McGeorge. The new company, whose plans are somewhat indefinite as yet, will have a large floor space in the Caxton building, into which quarters it will move in about a week. The new shop equipment has been practically arranged for and will be suitable for the manufacture of machine tools, bench drills and other accessory specialties. The shop will also be intended for experimental work in connection with the McGeorge & Sons' Engineering Co., contracting engineers. Just what other work will be entered upon has not been decided and more information concerning the company's product may be expected in the near future, when its plans are more matured.

The Cleveland Hardware Co. reports the wholesale hardware manufacturing business as very good. A large four-story brick addition is nearly completed at this plant, evidencing the prosperity of this concern.

The Engineers' Society of Western Pennsylvania.

The Engineers' Society of Western Pennsylvania will hold the following meetings in October and November.

Thursday, Oct. 19, 8:30 p. m., meeting of the chemical section.

Tuesday, Oct. 24, 8:00 p. m., meeting of the structural section.

Tuesday, Nov. 7, 6:30 p. m., an informal dinner at Kramer's Atlantic Garden.

Tuesday, Nov. 7, 8:00 p. m., meeting of the mechanical section.

These will all be held at the society rooms, 410 Penn avenue, Pittsburg, Pa.

At the meeting of the chemical section a paper on "The Use of Ammonium Persulphate in the Determination of Chromium for Steel," by Harry E. Walters, member, will be presented.

At the meeting of the mechanical section there will be an informal discussion on bearings, and at the meeting of the structural section there will be a paper presented on "The Uses of Steel for River Transportation," by Richard J. Donovan, non-member.

NAVY YARD EQUIPMENT.

Bids Opened for Considerable Quantity of Machinery and Supplies.

(Special Correspondence.)

WASHINGTON, Oct. 10.—Bids were opened this afternoon at the Bureau of Supplies and Accounts of the Navy Department for a considerable quantity of equipment and supplies for various navy yards. Among the bidders and the items upon which they submitted proposals are the following:

Austin Mfg. Co., Chicago, Ill., one rock crushing plant, $1,962.50.

Alliance Machine Co., Alliance, O., one single frame steam hammer, 800 lb., $1,085.

Algiers Iron Works, New Orleans, La., for repairing all damage to 10-ton locomotive crane caused by overturning, $1,450.

The Allis-Chalmers Co., Milwaukee, Wis., one rock-crushing plant, $2,175.

Brown & Sharpe Mfg. Co., Providence, R. I., one No. 2-A universal milling machine, $1,789.70.

Becker-Brainard Milling Machine Co., Hyde Park, Mass., one No. 2-A universal milling machine, $1,685.

Baird Machinery Co., Pittsburg, Pa., one engine lathe, screw-cutting, 18 in., $579; one emery wheel grinding lathe, $89; one engine lathe, screw cutting, 24 in., $490; one No. 2-A universal milling machine, $1,571; one vertical drill press, $185; one single spindle sensitive drill press, $65.50; one magnetic metal separator, $105; one hydraulic shaft-straightening machine, $3,395; one hydraulic shaft-straightening machine, $210; one single frame steam hammer, 800-lb., $833; one hydraulic pipe-bending machine, $320; one pipe-bending machine, $139; one belt-driven universal radial drill, $1,175; one 6-ft. universal radial drill, $1,565.

J. B. Connell Iron Works, New Orleans, for repairing 10-ton locomotive crane, $887.

Camden Iron Works, Camden, N. J., one hydraulic shaft-straightening machine, capacity up to 10 in., $990; one hydraulic shaft-straightening machine, capacity up to 3 in., $520; one hydraulic pipe-bending machine, $530.

Carnegie Steel Co., Pittsburg, Pa., 42,900 lb. medium steel angles, $1,033.89; 71,240 lb. medium steel plate, $1,581.53; 8,000 lb. rivet steel, $177.60; 18,000 lb. flat bar iron or steel, $378; 5,100 lb. angle steel in bars of 20 in. length, $118.83.

Crucible Steel Company of America, Pittsburg, Pa., 8,000 lb. cold-rolled copper sheathing, $1,672; 2,000 lb. steel, 6 in. square, $78; 2,400 lb. sheet copper, $561.84; 8,085 lb., 50-carbon open-hearth alloy, $646.80.

Carpenter Steel Co., Reading, Pa., 8,085 lb. 50-carbon open-hearth alloy, two bids, $505.31 and $1,455.30; 3,195 lb. mild steel, $95.85.

Deitrick & Harvey Machine Co., Baltimore, Md., one belt-driven horizontal drilling and boring machine, $2,109.

Drew Machinery Agency, Manchester, N. H., one rock-crushing plant, two bids, $2,592 and $2,934; one magnetic metal separator, two bids, $115 and $183; one hydraulic pipe-bending machine, $332; one single frame steam hammer, 800 lb., $834.50; 25,000 button-head cap screws, $325.30; 168 dozen machine bits, $358.80.

The Fairbanks Co., one 30-in. engine lathe, two bids, $1,630 and $1,740; one engine lathe, screw cutting, 18 in., two bids, $575 and $617; one engine lathe, screw cutting, 24 in., four bids, $880, $945, $975 and $1,060; one No. 2-A universal milling machine, $1,768; one vertical drill press, $210; one belt-driven universal radial drill, two bids, $1,340 and $1,410; and one 70-ton rail and track scale, $1,324.

R. W. Geldart, New York city, one hydraulic shaft-straightening machine for shafts up to 10 in., $3,289; one ditto for shafts up to 3 in. diameter, $198, and one hydraulic pipe-bending machine, $299.

George Groton Machine Co., Racine, Wis., one engraving machine, $944.50.

Hendy Machine Co., Torrington, Conn., one engine lathe, screw cutting, 18 in., $675; one engine lathe, screw cutting, 24 in., $1,077; and one No. 2 A universal milling machine, $1,510.

Hill-Clarke Co., Boston, Mass., one 6-ft. universal radial drill, $1,750.

Handlan Buck Mfg. Co., St. Louis, Mo., one horizontal boring and drilling machine, $1,850; one vertical drill press, $195; one steam hammer, 800 lb., $834; one 37-in. vertical boring and turning mill, $1,750.

Lucas Machine Tool Co., Cleveland, O., one No. 1 horizontal boring and drilling machine, $1,640.

Motley, Green & Co., New York city, one rock-crushing plant, $2,023.68.

Manhattan Supply Co., New York city, one emery wheel grinding lathe, $147.50; one single spindle sensitive drill press, $42.85; one hydraulic shaft-straightening machine for shafts up to 10 in., $3,674; ditto for shafts up to 3 in., $240; one hydraulic pipe-bending machine, $374.

Manning, Maxwell & Moore, New York city, horizontal boring and drilling machine, $1,650; 30-in. engine lathe, $2,358; engine lathe, screw cutting, 18 in., two bids, $587 and $670; emery wheel grinding lathe, $69; engine lathe, screw cutting, 24 in., two bids, $1,056 and $935; No. 2-A universal milling machine, $1,584; vertical drill press, $174; sensitive drill press, $50; magnetic metal separator, two bids, $125 and $300; hydraulic shaft-straightening machine, shafts up to 10 in., $3,350; ditto, shafts up to 3 in., $200; 800-lb. steam hammer, two bids, $935 and $960; hydraulic pipe-bending machine, $310; one pipe-bending machine, $126; belt-driven horizontal drilling and boring machine, four bids, $1,400, $1,960, $1,510 and $2,070; one 37-in. vertical boring and turning mill, $1,450; belt-driven universal radial drill, three bids, $995, $1,030 and $1,140; one 6-ft. universal radial drill, $1,525.

Niles-Bement-Pond Co., New York city, horizontal boring and drilling machine, two bids, $1,700 and $1,910; 30-in. engine lathe, $1,800; engine lathe, screw cutting, 18 in., $598; engine lathe, screw cutting, 24 in., two bids, $1,033 and $973; No. 2 universal milling machine, $1,385; vertical drill press, $171; 800-lb. steam hammer, $870; horizontal drilling and boring machine, $3,250; 37-in. vertical boring and turning mill, two bids, $1,690 and $1,390; universal radial drill, $1,025; 6-ft. universal radial drill, $1,550.

Oliver Machinery Co., Grand Rapids, Mich., wood lathe, $595; belt-driven band saw, $351; hand planer and joiner, $423.

Pratt & Whitney Co., Hartford, Conn., sensitive drill press, $85.50; one belt-driven semi-automatic machine for making screw glands for surface condensers, $682.50.

Prentiss Tool & Supply Co., New York city, horizontal boring and drilling machine, $1,720; vertical drill press, $159; 800-lb. steam hammer, $835; 37-in. vertical boring and turning mill, $1,475; universal radial drill, $1,355; and 6-ft. universal radial drill, $1,849.

An Impressive Retrospect.—Scribner's Magazine has issued an interesting booklet containing a brief retrospect of the periodical for the last 18 years. A review of the leading articles, with reproductions of many illustrations, shows the broad field which the magazine occupies.

MUCH ACTIVITY

In the Republic District—Riverside Mine will be Unwatered.

(Special Correspondence.)

ISHPEMING, MICH., Oct. 16.—The Riverside mine, six miles west of Republic, is being unwatered. John Vogtline, one of three Marquette county men, who less than two years ago negotiated the deal for the Klomin mine, Republic, to the Flagler Steel Co., Chicago, which has since abandoned the property, has charge of pumping operations at the Riverside for a pool comprised of Chicago men. Oglebay, Norton & Co. have encouraged the operators with their work by promising to take over the property, if it proves up as well as expected. The mine is one of the wettest on the Marquette range. It was held under option and operated a few months by the Oliver Iron Mining Co. three years ago, but abandoned before a great deal of development work was done. There is some good ore in the mine, but the expense of keeping the water out was so great that the original operators were unable to work it profitably. There are two shafts, each down 400 ft. The water has been reduced to the 150-ft. level.

There is considerable activity in the Republic district. A syndicate of Ft. Wayne capitalists has secured an option on 110,000 acres of mineral and timber lands, extending from Republic to Keweenaw bay. It is proposed to erect a saw mill at Republic, in consideration of which the citizens of the town have offered to donate to the company a 40-acre tract on the east shore of the Michigamme river, near the business district. The company also proposes to build a railroad over the tract, establishing headquarters at Republic.

The Republic mine is employing over 500 men this season, and many substantial improvements are being made about the property. Much of the old machinery has been replaced with modern plants, and several new buildings have been erected at the mine and in the town. The company's big stock piles will be cleaned out before navigation closes.

The Breitung estate, owners of the Mary Charlotte and Breitung hematite mines, Negaunee, are unwatering the latter, preliminary to resuming operations. The property has been idle. At the Mary Charlotte a mammoth coal trestle was recently completed. This gives promise of developing into one of Negaunee's best mines, as a large body of hematite ore of good quality has been encountered.

Pickands, Mather & Co. have installed a third diamond drill on what is known as the Gaffney tract, which the company has under an 18-months' option. The drill placed there was withdrawn from the rolling mill property, which the Jones & Laughlin Steel Co. has been exploring for two years past, starting a double compartment shaft there two months ago. The Cleveland-Cliffs Iron Co. is operating three diamond drills in the eastern part of Negaunee, between the Negaunee and Maas mines, and the same corporation has three drills in operation at its Austin and Princeton mines, in the Swanzey district.

Stripping operations, conducted all season at the Moore mine, Cascade range, an Oliver company open-pit mine, will be suspended within a few days. The property has not produced any ore this season, but there is now a very large area of the deposit uncovered. Last season the Moore product was crushed at the Oliver's Escanaba plant.

The Oliver company has suspended shipments from the stock pile at the Volunteer mine, which has been idle a year.

The Cleveland-Cliffs, Pittsburg & Lake Angeline and Oliver Iron Mining companies will provide the Lake Angeline basin with a new launder that will cost in the neighborhood of $20,000. L. E. Chaussee, of Negaunee, has the contract. Part of the material is on the ground, and it is expected that the launder will be completed before Dec. 1.

On the New Ranges.

DULUTH, Oct. 16.—Two small shafts are to go down at once on the Vermillion range, and it seems to be generally conceded that the way to explore that district is by these rather than by drills. The drill work done there has been very costly and never has been satisfactory. Section 30 lessees are working and have their shaft down a few feet. Capt. Hoar, of Negaunee, has been appointed superintendent of the work. This is to be a small exploratory shaft, and is located to strike the ore that was found two years ago by the Clergue syndicate at the depth of 150 ft. After finding this ore, the shaft will keep in it as far as possible. It is hoped to sink to about 1,100 ft. The White Iron Lake Iron Co., which has been drilling on magnetite formations south of Ely for the past two years, is now to sink a small shaft there. This will be on Section 2-62-11. This company is sinking a drill hole and is down 750 ft. A former hole was down 1,100 ft. before it was drawn. Some excellent seams of magnetic ore and much good looking formation is said to have been cut and the company is encouraged to continue work for some time yet.

All stocked ore at the Fayal and Adams mines has been shipped, and the four steam shovels that have been working in stock have been withdrawn. The two mines are shipping heavily, but not so much as last week.

The mines at Ely are all about through with stock-pile shipments. Chandler and Pioneer have withdrawn all shovels in stock piles, and the Zenith and Savoy are about through. The Minnesota has no ore in stock.

Drills on Section 3-55-25, on the western extremity of the Mesabi range, have been working in ore for some time. They have now cut it to the depth of 200 ft. This ore is of the usual silicious character of the Western Mesabi, and averages about 48 percent iron. It is owned in fee by ex-Gov. Lind, of Minnesota, and is being explored by the Oliver Iron Mining Co., which has an option for lease. This is the most western of any successful exploration, being on the bank of the Prairie river, and only 2½ miles from the town of Grand Rapids, on the Mississippi river. In Section 2 ore has also been proved, and the two bodies are doubtless one and the same. This is under option to the same company. The two, with other work by the Oliver company west of the present terminus of its new railroad at Bovee, will make the extension of the road a certainty through as far as the Mississippi river, in a short time. At Bovee the company is working on three shafts, two north of the section line dividing 20 from 31, and the third, a new one, south of that line in Section 31. The first or easterly shaft is being used for water alone, and is pumping a large volume, while the second and third will be for mining ores. Two new boiler and engine plants are to be erected at Bovee during the coming season. The Oliver company has accumulated at Bovee a large supply of material, and is erecting a number of houses there for its men and buildings for its equipment. A town site has been cleared off and the erection of buildings for stores, a bank and the inevitable many saloons is already well along. The railroad will probably reach the place some time during the coming winter season. At present everything used there must be hauled over roads none too good for many miles.

A NEW QUICK-OPENING, SELF-PACKING STEAM RADIATOR VALVE.

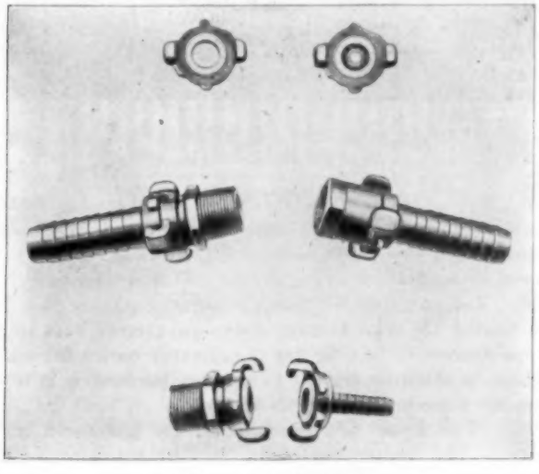
Crane Co., Chicago, have recently put on the market the self-packing quick-opening radiator valve shown herewith. The self-packing feature precludes any possibility of these valves leaking at the stuffing boxes. By a special device placed in the stuffing boxes the packing is automatically kept tight and will last a long time without renewal. The device consists simply of a vulcanized washer, located in the top of the stuffing box, and kept in position by spring compression, which fully compensates for the wear on the washer. The valves open and close by

QUICK OPENING RADIATOR VALVE.

turning the lever handle one-half turn. This handle can be operated by the foot as well as by hand. When closed the discs bear on the seats very tightly and the valve is locked in place until released. The bonnets of these valves are interchangeable with the bonnets of Crane regular radiator valves, allowing the user of the old valves to equip them at any time with the new improvement.

THE CHICAGO HOSE COUPLER.

The Chicago hose coupler was designed by the Chicago Pneumatic Tool Co. to meet the demand for a universal coupler whereby a plant once standardized could economically thereafter be maintained standard without extra ex-



CHICAGO HOSE COUPLER

pense for specially constructed couplers to suit various sizes of hose used with pneumatic tools.

By reference to the illustration it will be observed the coupler has no male or female part at coupling end proper, but instead, each half has embodied therein both male and female features, whereby each and every half is exactly the same and will couple regardless of the style and size of the shank, rendering the same a universal coupler in every sense of the word. It will readily be seen that quarter-inch hose may be coupled to three-quarter-inch hose, one-inch pipe, or to anything having one of the couplers attached to it.

The shanks are manufactured for pipe male thread, pipe female thread, and hose in standard commercial sizes from one-quarter inch up to one inch, which enables all couplings to be made without resorting to reducers or special shanks to meet the conditions presenting themselves where pneumatic tools are in use.

A LARGE EXHAUST HEAD.

A large exhaust head manufactured by the Burt Mfg. Co., of Akron, O., for the Jones & Laughlin Steel Co., of Pittsburg, Pa., is shown in the accompanying illustration. The head is for a 30 in. exhaust pipe and is made

A LARGE EXHAUST HEAD.

of No. 10 gauge iron. It measures 10 ft. in height and 9 ft. 4 in. in diameter. Its weight is 3,100 lb.

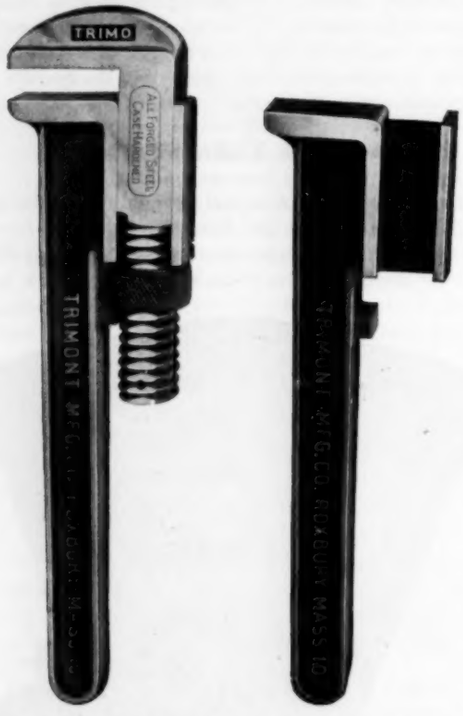
The same company made a still larger exhaust head for the Salem Iron Co. This was also made of No. 10 gauge iron and weighed 4,200 lb. Another large exhaust head made by this company was for a 34-in. pipe and was built for the United States Steel Corporation.

First Number of "Woodcraft."

Wood Craft, appearing as a monthly and incorporating *The Patternmaker*, is a highly creditable addition to the trade journals devoted to wood working. Its first issue, under the able editorship of Mr. Robert I. Clegg, presents a very attractive appearance typographically, its illustrations are artistic and the reading matter is of a high grade of excellence. The number and character of its advertisements of manufacturers of wood-working machinery show the substantial recognition which the journal is already receiving. *Wood Craft* is published by the Gardner Publishing Co., Cleveland.

THE "TRIMO" MONKEY WRENCH.

The Trimont Mfg. Co., Roxbury Mass., manufactures the monkey wrench shown in the accompanying illustration, for which it claims a number of advantages. The wrench has but three parts besides a small plug and pin which are used to close up the slot at the threaded end of the movable jaw. The three parts are the handle, the nut and the movable jaw. These are all drop forged from



"TRIMO" WRENCH AND STEEL HANDLE OF WRENCH.

steel and case hardened. The thread of both the jaw and nut are rounded, and they will not strip or become battered in ordinary rough usage. A feature claimed for the wrench is that the leverage increases in proportion to the increased size of the nut to which it is applied. The jaw extends forward instead of toward the handle in adjusting, thereby making a longer leverage.

A number of tests were made on this wrench in the

MOVABLE JAW OF "TRIMO" WRENCH.

testing machine of the United States Arsenal, Watertown, Mass. on July 5, 1905. The 10-in. wrench with the 8-in. leverage had a load applied to it varying from 200 lb. to 960 lb. The first deflection was shown at a load of 400 lb., the deflection being 0.11 in. At 700 lb. the deflection was 0.30 in.; at 900 the deflection was 0.48 in., and at 960 lb. the wrench broke. The set of the wrench at 900 lb. was 0.20 in.

A wrench of the ordinary type, tested in competition with it, showed a deflection of 1.57 at 652 lb. At 600 lb. the deflection was 1.70 in., and the set 1.59. The 12-in. wrench with a 9-in leverage broke under a load of 1,586 lb. The 15-in wrench with a 12-in. leverage broke under a load of 1,738 lb.

BLAST FURNACE GAS PURIFICATION, SYSTEM ZSCHOCKE.

Experience has shown that blast furnace gas can be used for gas engines only if it is well purified and if it is cooled to 20 or 25 degrees C. For heating the Cowper stoves the gas might contain somewhat more dust, the channels remaining clear at a dust content of 0.2 to 0.3 gram per cubic meter of gas.

In using impure gas the yield of the stoves is about 50 percent, this yield being increased to 75 to 80 percent by using purified gas. This means a 50 percent saving of gas or 50 percent increase in the heat of the blast, or a corresponding saving in the expense for coke.

Besides this advantage in the use of purified gas, it is to be mentioned, that thereby no slag is formed on the Cowper bricks. Every iron man will appreciate a saving in the renewal of bricks and other repairs resulting out of this application.

The question has been asked how a gas purification is carried out most economically, respectively, what system

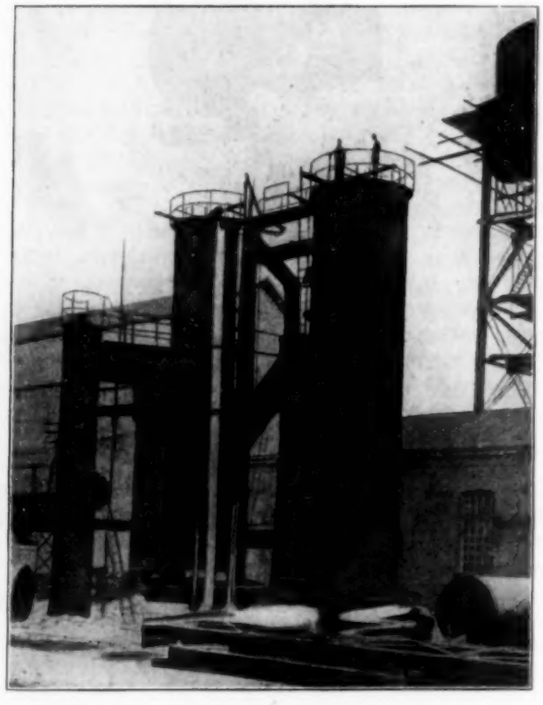


FIG. I.—A ZSCHOCKE SYSTEM GAS PURIFICATION PLANT UNDER CONSTRUCTION.

is the most advantageous regarding the cost of construction and continuous running. Many experiments have been carried out along these lines, and the qualities required of a good purifying system are given below:

(I) The gas must be cooled to 20 or 25 degrees C. The gas leaving the blast furnace shows an average heat of 120 to 150 degrees C. As the gas is ordinarily cooled behind the furnace to about 80 degrees C. the wet purification is to accomplish a cooling of 55 to 60 degrees C.

(II) The steam and moisture of the gas must be removed. The content of steam is different according to local conditions, moisture of ore and coke, etc., 100 grams of water per cubic meter of gas being about the average.

(III) The flue dust has to be removed down to 0.1 grams to .02 grams per cubic meter according to the use of the gas. The dust content of the gas depends on the size of the ore used, and the way of running the furnace.

A good purifying method has to fill these three requirements.

The Zschocke Machine Works having made a specialty for many years of blast furnace gas purification, have been very successful with their experiments. The Zschocke

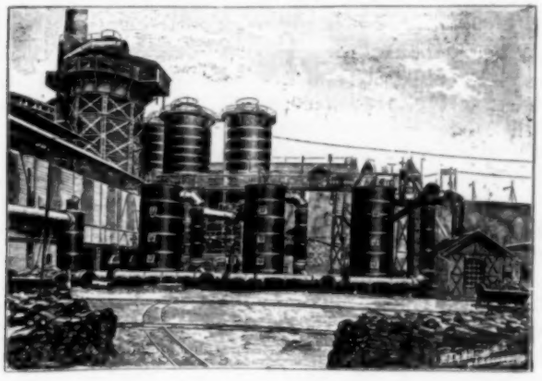


FIG. 2.—A COMPLETE GAS PURIFICATION PLANT, ZSCHOCKE SYSTEM.

System of purification consists in washing the gas in scrubbers and passing it afterwards through a system of ventilators. The dust content of the gas to be purified amounts to 6 or 7 grams per cubic meter. The gas goes first through two scrubbers (System Zschocke) which are provided with wooden washing plates especially constructed for blast furnace gas purification, so that a stopping of the openings is impossible as was shown by an experience extending over more than two years. The washing boards are built into the scrubber in rectangular fashion, one above the other, and are kept at a certain distance from each other for increasing the effect. For further increasing the effect they are provided with a triangular cut. It is of importance to have these washing boards absolutely horizontal for preventing the water

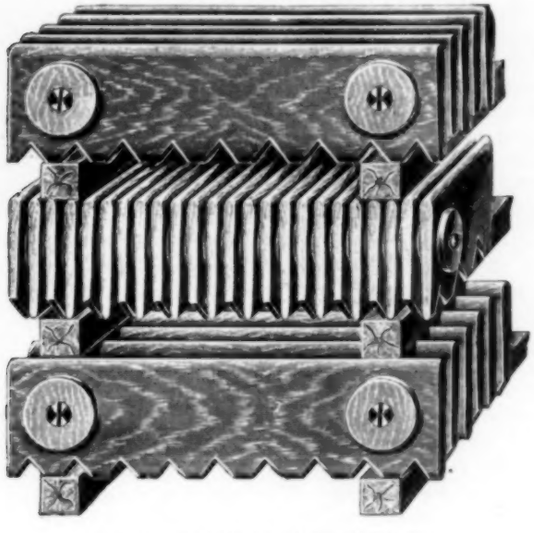


FIG. 3.—SECTION OF WASHING PLATES.

from running off on one side. The openings in the washing boards are decreasing from the bottom to the top, as the entering gas contains much more impurities than the gas leaving the apparatus.

The connections to and from the washers are installed so that one of the washers can be easily put out of operation if so required.

After leaving the washers the gas has a temperature of 20 degrees to 25 degrees C. and contains 20 grams of steam and 1½ to 2 grams of dust per cubic meter. This wet dust is removed in fans into which the gas is led from the washers or scrubbers.

After leaving these ventilators the gas contains 0.3 to 0.5 grams of dust per cubic meter and is therefore very well adapted for heating the Cowper stoves, boilers, etc. For use in gas engines it has to go through another set of ventilators. When leaving this second set of ventilators the gas contains 0.02 to 0.03 grams of dust per cubic meter and is therefore sufficiently pure for gas engines. In places with insufficient supply of water, the same water can be used over again after passing through settling tanks.

As a good many Zschocke purifying plants are working in Germany, especially in the largest iron works, with

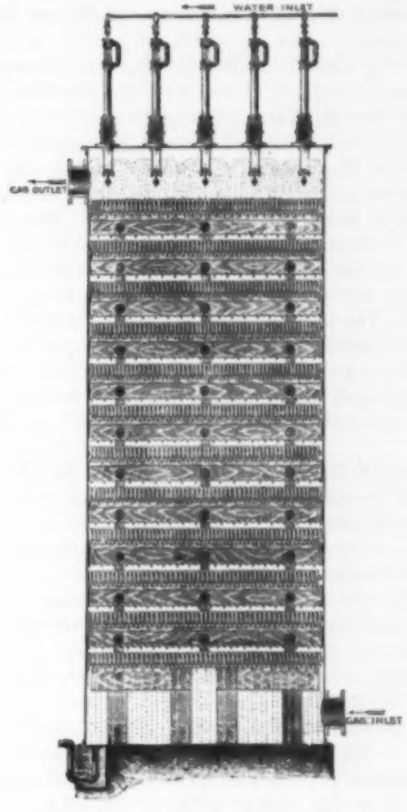


FIG. 4.—INTERIOR OF SCRUBBER.

the utmost satisfaction, there is no doubt that this system is filling the requirements (I) to (III).

It is claimed by the makers that less than half of the power of other systems is used in this method, and the quantity of water used is reduced to a very small quantity. The running expenses are very low and the apparatus exceedingly simple.

The cost of a plant depends on the following considerations:

I. Quantity of gas to be purified per minute.

II. Purpose for which the purified gas is to be used.

III. Temperature of gas, steam and dust content at entrance to first washer.

IV. Quantity of water at disposal or necessity of using the water over again.

V. Plan of ground.

The Zschocke Machine Works are represented in the United States by Dr. Oskar Nagel, 90 Wall street, New York city.

NEWS FROM MANY INDUSTRIES.

New Buyers :—

The Huntington Rail Mfg. Co., Huntington, W. Va., has been incorporated with $25,000 capital stock.

The American Machinery Co., Cleveland, has been incorporated by G. A. Laubscher, G. M. Phillips, J. M. Hall, L. J. Litzler and A. E. Fischer.

The Denver Gas Engine & Appliance Co., Denver, Colo., has been incorporated with $10,000 capital stock by W. H. Coburn, Fannie Toogood, H. Heber Toogood.

The Kane Cutlery Co., of Kane, Pa., has been chartered at the State capital and will establish and operate a plant in Kane. The capital of the company is $25,000.

A Pennsylvania charter has been granted to the Wilcomb Machine Co., of Norristown, which has a capital stock of $50,000.

The Huxley Valve Co., Buffalo, N. Y., has been incorporated with a capital of $20,000 with the following directors: Hiram R. Watson, David H. Donaldson, Thomas J. Overturf, Arthur R. Jackson and Nelson S. Hallett.

The Dover Pig Iron Co., Stewart county, Tenn., has been incorporated with a capital stock of $15,000. The incorporators are John H. Lory, Chas. Bruton, I. C. Lewis, T. J. Brandon and James W. Brandon.

The Eli Bridge Co., Roadhouse, Ill., has been incorporated with a capital of $25,000 to manufacture structural iron work. The incorporators are John H. Graves, W. E. Sullivan and William C. Roadhouse.

The Hubbard Portable Oven Co., Chicago, has been incorporated with $50,000 capital stock. The incorporators are H. O. Bennett, Glover H. Bennett and John W. Hicklin.

The Manzell Bros. Co., Buffalo, N. Y., has been incorporated to manufacture lubricants for machinery, manufacture machinery, etc. The capital stock is $30,000. The incorporators are Adolph Manzel, Herman J. Manzel, Fredericka Manzel, all of Buffalo.

The Northern Ohio Metal Refining Co., Toledo, O., has been incorporated with an office at Norwalk. Its capital stock is $25,000. The incorporators are John W. Risser, Charles R. Clapp, Katherine Risser, Ira C. Taber and John H. O'Leary.

The Rathbun-Lacy Co., Toledo, O., has been incorporated with a capital stock of $30,000 for the purpose of building marine gas engines. The incorporators are Percy C. Jones, Paul H. Jones, Edward Rathbun, Volney E. Lacy Jr., Frank H. Lacy and W. L. Lamb.

The Advance Machine & Supply Co., Indianapolis, Ind., has been incorporated to manufacture, buy and sell hardware, tools, etc. The capital stock is $10,000, and the incorporators are William Williams, George W. Williams and Lewis Wallace.

The Baldwin & Kuhn Co., Baltimore, Md., has been incorporated with a capital stock of $25,000 to deal in machinery. The incorporators are William D. Baldwin, L. Dodsworth Kuhn, E. Francis Baldwin, Wilbur A. Edwards and Henry P. Bridges.

The Western Steel & Iron Co., Council Bluffs, Iowa, has been incorporated with business offices and manufacturing plant at Council Bluffs. The officers are: President, John Durkee; vice president and general manager, C. L. Felt; secretary and treasurer, F. J. Cole; directors, S. B. Kibler and Charles B. Martin.

The Cooley General Development Selling Co., Boston, has been incorporated to deal in engines. The capital stock is $10,000. The officers are: President, John F. Cooley, 620 Atlantic avenue; clerk, Arthur E. Thayer, 53 State street; treasurer, Josiah Quincy, 84 State street, all of Boston.

The Austin Cormack Engine Co., New York, will manufacture engines, machinery, etc. The capital stock is $5,000 and the incorporators are Frederick Cormack, Newburgh, N. Y.; William Austin, 164 Twelfth street; Maurice H. Cormack and George M. Kennoch, both of 309 West Twenty-ninth street, all of New York.

The Alonzo H. Magee Co., Catskill, N. Y., has been incorporated with a capital stock of $30,000 to manufacture machinery, etc. The incorporators are Alonzo H. Magee, 93 Claremont avenue; Richard Magee, 147 Grant avenue, both of Jersey City, N. J., and Charles E. Francis, 264 Monroe street, Brooklyn, N. Y.

The Highland Foundry Co., Boston, Mass., will deal in stoves, ranges, etc. The capital stock is $15,000. The incorporators are Edwin Chapman, No. 37 North Market street, president; Livingston Cushing, No. 10 Tremont street, treasurer, and H. D. McClellan, of the same address, clerk. All the officers are of Boston, Mass.

The Burke Land & Iron Co., Morgantown, N. C., has been incorporated with a capital stock of $10,000 for the purpose of developing timber and mineral lands, etc. The incorporators are S. J. and S. S. Kirkpatrick, Jonesboro, Tenn.; R. Williams, J. M. Mull and A. C. Avery Jr., Morgantown, N. C.

The American Standard Mfg. Co., 525 Main street, East Orange, N. J., has been incorporated as mechanical and electrical engineer, machinist, toolmaker, etc. The capital stock is $125,000. The incorporators are Francis Mack, James W. Blake and Frederick A. Booth, all of East Orange, N. J.

The Highland Foundry Co., Boston, Mass., has been incorporated to deal in stoves, ranges, etc. The capital stock is $15,000. The incorporators are Edwin Chapman, 37 North Market street, president; Livingston Cushing, 10 Tremont street, treasurer, and H. D. McClellan, of the same address, clerk. All the officers are of Boston, Mass.

The Great Western Iron Co., Tacoma, Wash., has been incorporated to acquire, own and operate iron mines in the state of Washington and to build and operate steel rolling mills and railroads. The incorporators are J. A. Moore, Seattle; H. Mershon, Louis Stockler, M. M. Lyter and M. Ray Wood. The capital stock is placed at $500,000.

The Moline Foundry Co., Moline, Ill., has been incorporated with a capital stock of $6,000. The new company will operate a foundry and machine shop. The incorporators are John R. Weeks, Peter J. Kail and Sam S. Hoffman. The construction of a foundry building 60 x 80 ft. is already well under way. Rattling rooms, core rooms, etc., will be located outside.

A new limestone company has just been organized by Pittsburg and Philadelphia capitalists to develop the limestone territory lying along the route of the Allegheny & Western railway extension from the Bessemer railroad in Butler to New Castle. The company is capitalized at $2,000,000. Thomas J. Mervin, of Portersville, is secretary of the company.

The Brewster Automobile Co., New York, has been incorporated to manufacture vehicles operated by power. The incorporators are Cairn C. Downey and Henry M. Duncan, Flushing, N. Y.; George M. White, 213 East Forty-fourth street; Rachel S. Brewster, 233 East Fifty-second street, New York; Mary A. Brewster, 1413 St. James Terrace, Philadelphia, Pa. The capital stock is $10,000.

F. L. Baldwin, formerly with the Portsmouth (O.)

Foundry & Machine Works, is at the head of a movement to organize a company for the manufacture of high grade tool steel at that place. The company is to consist of local capital principally. The plant is to consist of a 24-pot crucible melting furnace complete, one heating furnace for ingots, one heating furnace for finishing, one annealing furnace, one 800-lb., one 1,000-lb. and one 4,000-lb. steam tilting hammer, shears, boiler and blower. Natural gas will be used in the plant.

The Southwestern Iron Co., Guthrie, Okla., has been incorporated with $25,000 capital stock. The new company will make structural iron, stoves, windmills, pumps, plumbing and general iron work. The Oklahoma Iron Works have been absorbed by the company which expects to erect a new plant in the near future. The officers are C. H. Martindale, president and general manager; Robert Sohlberg, treasurer, and J. H. Milan, secretary. The board of drectors is Judge Dale, Robert Sohlberg, L. H. Lohr, Ben Hegler, C. H. Martindale, Lou Beadles and J. H. Milan.

The following companies have been incorporated under the laws of Ontario:

The Fox Bearings, Ltd., head office, Toronto; capital $40,000. Provisional directors: Tobias Fox, Thomas Sullivan and John Nicol.

Standard Bolt & Screw Co., Ltd., head office, Toronto; capital, $40,000. Provisional directors: Thos. Clark, Percival S. McKergow and John Jennings.

A charter has also been granted to the Canada Steel Goods Co., Ltd., head office, Hamilton; capital $115,000; the company being an amalgamation of the company lately doing business under the same name with the Grand River Metal Works, of Galt. The provisional directors are John S. Ainslie, Ralph O. Y. Ainslie, A. F. Hatch, Arthur Ludlam, A. G. Moffatt, J. D. Ainslie, J. S. Wardlaw, Chas. Cumming and Geo. Hancock.

Fires:—

The Wilson Foundry, Wilson Village, N. Y., was destroyed by fire Oct. 4, with a loss of $10,000.

The Lebanon Foundry & Machine Shops, Lebanon, Ind., was considerably damaged Oct. 4 by a fire.

The oil house of the Monongahela Iron & Steel Co., Homestead, Pa., was destroyed by fire Oct. 5.

The laboratory at the Joliet, Ill., plant of the Illinois Steel Co., had a $3,000 blaze Oct. 6.

Wheel foundry No. 2 of the American Car & Foundry Co., Huntington, W. Va., was almost destroyed by fire Oct. 6. The adjoining buildings were not damaged.

R. Estabrook's Sons' iron foundry at Boston, Mass., suffered from fire Oct. 10. The loss including that on several adjacent buildings is $60,000, partially insured.

The shop building of the Riverside Foundry & Machine Co., Riverside, Cal., was destroyed by fire Oct. 6 with a loss of $30,000, largely in patterns.

The old steel plant at the Portsmouth navy yard was destroyed by fire Oct. 7 and the new steel building now in process of construction was considerably damaged. The loss is placed at $8,000.

New Construction:—

S. G. Flagg & Co. are building a large foundry at Pottstown, which will be an addition to their plant.

New buildings now being constructed by the Morris Machine Works, Baldwinsville, N. Y., will increase machine shop facilities about one-third.

The National Stove Co., Lorain, O., is building a brick and steel addition, 100 x 81 ft., which it hopes to have completed before Jan. 1.

The Midvale Steel Works, Nicetown, Pa., will build an extension to the armor plate tempering shop at a cost of $27,000.

The new plant of the United Drop Forging Co., Springfield, Mass., is practically completed and will be placed in full operation at an early date.

The Mitchell, Diggins Iron Co., Cadillac, Mich., expects to put its new charcoal furnace plant in operation soon after Jan. 1, with a daily capacity of over 100 tons.

The Johns & Steward Machine Co., Birmingham, Ala., has doubled the capacity of its machine and blacksmith shops.

The Morse Chain Co. will erect a steel and concrete plant at Ithaca, N. Y., to be operated in conjunction with its present factory at Trumansburg, N. Y.

The Canadian Pacific railway is erecting five new buildings in connection with the Angus shops in Montreal at a total cost of $62,350. The principal structure will be a car shop to cost $32,000.

Over 7,000,000 brick are being used in the new buildings being constructed at West Allis, Wis., for the Allis-Chalmers Co. It is expected that a number of the structures will be ready for use by Jan. 1.

The Western Foundry Co., Chicago, intends erecting a new foundry building 115 x 250 ft., a cleaning building 60 x 272 ft. and a core room 60 x 75 ft. The necessary machinery has not yet been purchased.

The Howe Scale Co., Rutland, Vt., will erect a three-story pattern shop 50 x 80 ft. with a three-story fireproof vault for the storage of perishable books and drawings and valuable standards of weights.

The C. A. Lefferts Co., 128 Second avenue, Brooklyn, N. Y., has taken out a building permit for a brick foundry 90 x 200 ft. The work is in charge of H. Helder, architect, 242 Franklin avenue.

The Moffatt Machinery Mfg. Co., Charlotte, N. C., is building a foundry and machine shop. W. E. Moffatt, formerly of Park Mfg. Co., is president and engineer of the company.

The Lookout Mountain Iron Co., Battelle, Ala., has opened new coal and iron mines on its property at that place and is making extensive improvements on its furnace.

The Miners Foundry & Supplies Co., recently incorporated at Carterville, Mo., will build a foundry equipped with a 10-ton cupola, crane and traveling trolley, and is in the market for machinery.

Forwell Bros., of Berlin, Ont., are preparing the plans for a foundry which will require several buildings, one 52 x 100 ft. and another 35 x 100 ft. In addition there will be a stock shed 29 x 65 ft. and a metal supply shed 18 x 115 ft.

The Southern Co-operative Foundry Co., North Rome, Ga., is building a new foundry, making additional molding space 40 x 60 ft. and 70 x 136 ft. It is also erecting an additional two-story building 70 x 135 ft. for stove mounting and manufacturing steel ranges.

The Matheson Motor Car Co. has outgrown its plant at Holyoke, Mass., and is erecting buildings at Wilkesbarre, Pa., where it expects to be located about Jan. 1. Its capital stock was recently increased from $600,000 to $1,100,000.

The Holland-American Construction Co., recently incorporated under the laws of New York and backed by Westinghouse interests, is planning the construction of an extensive electric railway system from the German frontier to the North Sea, a distance of 115 miles. A number of branch lines is expected to increase the length to about 250 miles.

The Canadian White Co., Ltd., has been awarded the

contract for erecting the eight-story steel building at Hamilton, Ont., to be occupied by the Federal Light Assurance Co. as head office. It is to be completed by Aug. 1, 1906. The same company will construct the car sheds for the Montreal Street Railway Co.

The Bessemer Coke Co., Pittsburg, has let the contract for 50 additional coke ovens at its Martin plant and for complete electrical equipment at its Griffin plants No. 1 and No. 2. The Pittsburg Coal Washer Co. will install a complete washer at the Martin plant. These improvements together with the purchase of coal recently made means an expenditure of approximately $250,000.

Davidheiser & Wiand, contractors, of Pottstown, Pa., are erecting a new foundry plant for Stanley G. Flagg & Co., of the same city. The new building is to be 100 x 240 ft. and will replace a structure 80 x 200 ft. which was burned last February. The work is now being carried on in a temporary foundry which was erected just after the fire.

Charles M. Schwab is quoted as saying that the Union Iron Works, of San Francisco, controlled by the Bethlehem Steel Co., will be greatly enlarged both for the building of ships and for the production of mining machinery.

The Specialty Mfg. Co., Lafayette, Ind., has purchased a site for an office building and later intends to erect a factory. In the meantime the plant is to have its patents manufactured on a royalty.

The Scullin-Gallagher Iron & Steel Co., St. Louis, is erecting a new casting plant for the manufacture of machinery and miscellaneous castings, while the old plant will be worked exclusively on railroad castings. Four large buildings will be erected and four 20-ton basic open hearth furnaces installed. The Morgan Engineering Co., Alliance, O., is building a number of cranes and charging machines for the plant.

General Industrial Notes:—

The Eleanor Iron Co., Tyrone, Pa., has started its mill on bar iron.

The Eastern Steel Co. has started another of its large mills at Pottsville. Pa.

The E. & G. Brooke Iron Co. has blown out one of its furnaces at Birdsboro, Pa., for repairs.

The Reading Iron Co. is arranging to start its sheet mill at Reading, Pa., and is advancing other improvements to its mills.

Official denial is made of rumors that the Siberia puddle mill at the Union Iron Works of the Carnegie Steel Co., Youngstown, O., is to be dismantled.

The LaFollette furnace at LaFollette, Tenn., has blown out for exensive repairs, and will be out of blast for 60 days.

The Penn Bridge Co., Beaver Falls, Pa., has been awarded the contract for the construction of the concrete steel bridge over the Washington channel of the Potomac.

The Continental Can Co. is planning the removal of its machine shop at Rochester, N. Y., to its plant at Syracuse, N. Y., where the scope of its output will be increased.

The Harrisburg Pipe & Pipe Bending Co., of Harrisburg, Pa., is planning to start its new blooming mill on Oct. 30. It is a 36-in. mill.

The York Radial Railway Co., owning local electric lines, has ordered 2,500 tons of steel rails from the Algoma Steel Works, Sault Ste. Marie, for the railway extension from Newmarket to Lake Simcoe, a distance of 24 miles. Another order for 2,000 tons will shortly be placed for track extensions west of Toronto.

The Eastern Iron & Steel Co., Pottstown, Pa., is now turning out about 100 tons of strucutral steel a day, operating the two smaller trains of rolls. The largest train is to be started at once, increasing the output to about 300 tons per day of finished steel.

The Columbus Structural Steel Co., Columbus, O., has its new plant well under way and expects to start early in January. The machinery and equipment have been purchased.

Advices from Argentina are that the bill regarding American importations, particularly agricultural machinery, will be adopted in such an amended form as to admit them free of duty.

The strike of the union chainmakers at York, Pa., bids fair to continue. The unions refused to accept the terms of the company because the union was not recognized at certain places.

Sheridan furnace, operated by the Berkshire Iron Works, at Sheridan, Pa., has been blown out for repairs, which will be rushed day and night. The company has been operating only one furnace, the second being idle.

James D. Wilson, as receiver of the Solid Steel Tool & Forge Co., Brackenridge, Pa., has operated the concern at a profit and his receivership has been extended until Jan. 1.

The St. Lawrence Supply Co., recently incorporated at Montreal to conduct a general machine agency, is planning to install a plant as engineer and machinist and expects to employ from 20 to 40 men at the outset.

The Lehigh Valley Railroad Co. has purchased the collieries and mine properties of Coxe Brothers & Co. in the Pennsylvania anthracite district, with an annual capacity of more than 2,000,000 tons.

Ph. Bonvillain, engineer at 6 Rue Blanche, Paris, has associated with himself E. Ronceray, general superintendent of his departments of commerce and construction, and the new firm is established at 9 and 11 Rue des Envierges.

The officers of the company which have purchased the plant of the Dake Engine Mfg. Co., Grand Haven, Mich., are: Thomas Johnston, president; Mr. Campbell, vice president; J. F. Johnston, treasurer, and J. P. Armstead, secretary and general manager.

The Hussey Farm Tool Co., Indianapolis, Ind., recently incorporated, succeeded to the business of the Wagner Plow Co. and the Hussey Mower Co., of Knightstown. The officers are: R. W. Hussey, president; J. D. Kyle, vice president, and T. K. Smith, secretary.

The Gibson-White Foundry Co., Alton Park, Chattanooga, has its new plant in full operation. It recently purchased the plant of the Southern Iron Works, made extensive improvements to the buildings and installed new machinery. Stoves, grates, etc., are manufactured.

The Carnegie Technical Schools began work this week with an enrollment of 120, picked from a list of over 1,700 applicants. The small number admitted is all that can be accommodated until other buildings, now under construction, are completed. Eighty of those in attendance are from Pittsburg and vicinity.

The Herring-Hall-Marvin Safe Co., recently incorporated in New York with a capital stock of $700,000, takes this step merely to surrender its New Jersey charter and reduce its capital stock from $3,300,000, which consisted of first and second preferred and common, to one line of stock. No other changes are contemplated.

During September 27,443 tons of steel rails left New York, of which 13,306 tons went to Argentina, 8,838 to Cuba, 3,450 to Mexico and 1,849 to Chili. Australia bought heavily of wire, wire nails and pipe. New York exports of iron and steel material for the month set a new record.

A new relief association has been formed in the plant of the American steel hoop branch of the Carnegie Steel Co. to take the place of the old association recently dissolved. A board of 27 directors has been chosen.

The Van Wie Pump Co., Syracuse, N. Y., which was recently incorporated, has taken over the Baldwinsville Centrifugal Pump Works, operated by Irving Van Wie, and will continue the manufacture of centrifugal and triplex pumps. Irving Van Wie is president and general manager of the new company.

There is a probability that the marine hospital at Pittsburg for which plans have been prepared will not be erected in the near future. The claim is set up that the number of cases eligible for treatment is so small as to make the large expenditure for this purpose a waste of money.

The Cross Mountain Iron Co., Bristol, Tenn., whose incorporation was mentioned in a recent issue, has purchased from the Boston Iron & Timber Co. the rights of 6,900 acres of fine timber and iron ore lands at the headwaters of Stoney Creek, the property lying on Cross Mountain, Iron Mountain and the Holston Mountain.

The South Sharon tin mill of the American Sheet & Tin Plate Co., which has been idle since last May for improvements, is to resume operations Nov. 1, employing about 1,200 men. The capacity of the tinning department has been largely increased so that now all the material can be handled at this plant instead of shipping it to other plants for finishing.

Directors of the Phillips Sheet Tin Plate Co., Clarksburg, W. Va., have chosen E. W. Mudge, vice president of the LaBelle Iron Works, Steubenville, O., president, to fill the vacancy occasioned by the death of J. R. Phillips some months ago. Improvements to cost $20,000 were decided on. These will include an additional 20-ton electric crane with a five-ton auxiliary hoist, a duplicate electric plant, two new cold mills, four additional stacks in the tin house and a spare river pump. Contracts have all been let.

Trade Notes:—

The Westinghouse Stroker Co., Attica, N. Y., has begun the operation of its new foundry and will start its machine shop Nov. 1.

The Manistee Iron Works, Manistee, Mich., has sent a crew of workmen to Winsford, Eng., to set up a large number of vacuum pans.

Henry A. Hitner & Son, Philadelphia, have purchased from the Brooklyn Rapid Transit Co. 43 locomotives formerly used on the elevated lines.

The Byesville plant of the United Sheet & Tinplate Co., Cambridge, O., is being dismantled and removed to Newcomerstown, Pa., where it will be operated in connection with the plant there.

The Erie railroad has placed an order with the Barney & Smith Car Co., Dayton, O., for the construction of experimental steel passenger coaches for use in the New York suburban service.

The Norway Iron & Steel Co., York, Pa., has booked an order from the Pressed Steel Car Co. for more than 6,000 tons of gray iron castings, at a price exceeding $200,000.

The Carnegie Steel Co. has purchased from the Allis-Chalmers Co., Milwaukee, two large blowing engines at a cost of between $70,000 and $80,000 each. This makes 16 large engines ordered from this company during the year.

The Morgan Construction Co., New York, has sold to the Babcock & Wilcox Co., Bayonne, N. J., six producers for heating large forges and four producers of the same type to the Pennsylvania Railroad Co. for its Altoona shops.

The Hamilton Bridge Co., Hamilton, Ont., has obtained some important contracts for steel bridges, including one at Bracebridge over the Muskoka river at $14,000, and one at Mattawa, over the Mattawa river, at $8,900. The competition among bridge companies was very keen.

The Westinghouse Electric & Mfg. Co. has received two orders for electrical railway motors from the South Side Elevated Railway Co., Chicago, and the Consolidated Railway Co., New Haven, Conn., which aggegate in value about $500,000.

The Wellman-Seaver-Morgan Co., Cleveland, during the past week shipped overland a complete open hearth equipment for the Hang Yang Iron & Steel Co., which is building a thoroughly modern plant at Shanghai, China. The Cleveland company furnished the only American machinery ordered.

The Dominion Iron & Steel Co.'s rail mill at Sydney, N. S., has made a new record. On Oct. 12 its output amounted to 1,100 tons of rails, every effort being put forth to complete the Grand Trunk railway's order for 25,000 tons of rails by the end of the week, and to commence on a contract for 25,000 tons for the Inter-Colonial.

The Christopher Brick-Cleaning Machine Co., New York city, recently incorporated in New Jersey, will manufacture machinery which, it is claimed, can clean about 15,000 brick a day, while one man can clean only from 800 to 1,000. Thomas Franklin is president of the company, B. B. Neal, treasurer, and M. T. Christopher, secretary. The capitalization is $250,000.

TRADE PUBLICATIONS.

The National Electric Co., Milwaukee, has issued Bulletin 357, describing the Christensen air brake equipments for electric cars, and also Bulletin 355, describing belt-driven current electric generators.

The Fort Wayne Electric Works, Fort Wayne, Ind., has issued a number of bulletins describing its type M induction motor, type A transformer, and series alternating current arc lighting systems.

The Wagner Electric Co., St. Louis, Mo., has recently issued a number of publications describing transformers, electrical measuring instruments and single phase electric motors.

The Geneva Metal Wheel Co., Geneva, O., has issued a catalog describing various forms of metal wheels. Many different types of wheels are described and illustrated as well as a number of wagons made by the same company.

Industrial Engineering Co. of America, 32 Broadway, N. Y., has issued a catalog illustrating work done by it. This consists in the design of special machinery, the design and erection of shops and power plants, and general engineering work.

The Borger Bros. Co., Columbus, O., is distributing a catalog illustrating various types of tubular boilers. The catalog contains 50 pages, and in addition to the descriptions of boilers and their accessories, comprises considerable valuable data relating to power plants.

Blake & Johnson, Waterbury, Conn., have issued a catalog containing descriptions of machinery of various types. This includes slitting machines, foot and drop presses, punches, drilling machines, grinding machines, riveting machines, thread rolling machines, wire forming machines and special tools.

De Laval Steam Turbine Co., Trenton, N. J., has issued a little book describing De Laval Steam Turbine Machinery. This machinery consists of turbine pumps, turbine driven pumps, turbine driven alternator, turbine

motors, and centrifugal pumps of various types, and also blowing machinery.

The Ingersoll-Sergeant Drill Co., 11 Broadway, New York city, is distributing a publication devoted to coal mining machinery. This booklet illustrates the new Ingersoll coal cutter, the Radialaxe coal cutter, the Haeseler Coal Boring Machine, the Little Jap hammer drill and other tools.

The Illinois Steel Co., of Chicago, has issued through its cement department a catalog devoted to the Universal Portland cement. The catalog consists of a short description of the process of manufacturing, analysis and tests of the cement, and a large number of photographs showing places in which it has been used.

Baxter D. Whitney & Son, Winchendon, Mass., have issued a catalog on wood working machinery. The catalog illustrates planing machines, both single and double surface, wood scraping machines, shaping machines, wood lathes and other machinery. It also contains the history of the company and a biography of Mr. Baxter D. Whitney, the founder of the business.

The Hoffman Hinge & Foundry Co., of Cleveland, O., has just issued a very neat little booklet, 3½ x 6¼ inches, entitled, "From Blue Print to Finished Engine," in which it describes the foundry equipment and method of producing automobile castings and engine work as carried on by this company. It is very neatly printed and fully illustrated.

Horace See, 1 Broadway, N. Y., is distributing a booklet entitled "Some Sea Specialties," describing various apparatus, of use on shipboard. These include pilot house or cabin recorders for logs, signal light control and indicators, hatch covers, ash ejectors, marine boilers, evaporators and distillers, and other specialties. The book is illustrated with photographs of various types of vessels, including passenger boats, ocean steamers, battleships, torpedo destroyers and fire boats.

The Cook Manufacturing Co., Louisville, Ky., has issued a catalog describing the Cook metallic piston rod packing. Several different types of packing are described, including standard piston rod packing, Corliss valve stem packing, packing with box glazed and with shell glazed, and also special metallic packing for vertical piston rods. The book consists of about thirty-five pages, ten pages of which are devoted to a list of users.

The Foos Gas Engine Co., Springfield, O., is distributing catalog No. 16, describing the Foos gas and gasoline engines. The catalog gives a number of interior views of the shop, and describes and illustrates several types of stationary engines, and also portable engines mounted on trucks. Special engines for house and store lighting are shown and a number of combinations for electric work and pumping are also illustrated. A large part of the catalog is taken up with detailed descriptions of the various parts of the engines.

The Deming Co., Salem, O., has issued catalog G illustrating pumping machinery for operation by any power. The catalog contains about 115 pages and describes single acting triplex plunger pumps, both for belting to line shafting or direct connection for steam or gas engines, and double acting triple piston pumps for sewage disposal works, electrically driven pumps, deep well pumps, vertical and horizontal centrifugal pumps, air compressors, boiler feed pumps and accessories.

The Felt & Tarrant Co., Chicago, has issued a large amount of literature describing the comptometer, a machine for rapid calculation. The literature includes a booklet describing the uses and application of the machine to various businesses; list of users, directions for performing various operations, and testimonials. A particularly interesting list of users is that of iron works and machine shops, which on Sept. 1904 made a list in nonpareil type 52 in. long. A large number in this list have two or more machines, and one concern has 23 in use.

The Yale & Towne Mfg. Co., New York city, has recently issued its catalog No. 18. The catalog contains over 200 6 x 9 inch pages and is neatly bound in green board covers with red cloth back and gold lettering. It lists the company's goods most commonly called for, and in addition to padlocks, night latches, builders' hardware, door checks, etc., it contains a comprehensive glossary of technical terms and articles of interest on the mechanism and care of locks, lock picking, master-keyed locks, hand and bevel doors, etc. The volume is intended for general distribution and will be sent on request to hardware dealers, purchasing agents, architects, contractors, building superintendents and others who are interested.

The Wm. Tod Co., Youngstown, O., is distributing its catalog describing power engines. This catalog consists of 50 8 x 10 inch pages and illustrates a number of different types of engines, including piston valve engines, Corliss engines, and standard horizontal engines. The book is well illustrated and is printed on fine paper and contains a large amount of valuable information, giving tables of horsepower for different types of engines, table of cylinder ratios of the compound engines and overload coefficient for this type of engine. It also contains a number of indicator cards taken from various types of engines and comparisons are made between the cards showing the advantage of each type of engine for its work.

The Newton Machine Tool Works, Inc., Philadelphia, has recently issued a catalog No. 36. This catalog describes and illustrates machinery for army, navy, railroad, and general machine shop equipment. The book contains nearly 250 6 x 9 pages and describes a vast number of ordinary and special machines, including milling machines of various types such as plain, duplex, testpiece and special machines, slabbing machines, boring machines, vertical milling machines, key seating machines, rotary planing machines, rail bending machines, and a large number of drilling and slotting machines. This company has also issued a number of special catalogs devoted to special type of machines. These catalogs are No. 35, which describes a new method of key seating; No. 38, which is devoted to slotting machines; No. 39, cold saws and cut-off machines; No. 40, vertical milling machines, and No. 41, devoted to rotary planing machines.

The W. B. Davis Machine Co., Rochester, N. Y., has just brought out a handsome 400-page catalog, describing a complete line of machine tools and supplies. The book is 7 x 9½ in., well bound in cloth, printed on good paper, and thoroughly illustrated. A large line of machine tools are described, including speed and engine lathes, the engine lathes ranging in sizes from 10 in. to 42 in., key seating machines, cutting-off machines, drill presses, Brown & Sharpe milling machines of the plain, hand and universal type; together with attachments for them, Brown & Sharpe grinding machines, planers and shapers of various sizes and styles, power presses, hand saws, buzz saws, wood planers and other tools. The supplies listed include steam engines and boilers, steam and power pumps, centrifugal pumps, steam engine governors, shafting hangers, pulleys, sprockets, lathe clutches, punches, lathe tools, drills, reamers, milling motors, vices, bolts, nuts, oilers, and chain hoists. The book presents an extremely handsome appearance and is a complete index to the standard machine tools as built at present.